```
=> fil reg
FILE 'REGISTRY' ENTERED AT 13:24:48 ON 14 DEC 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2006 American Chemical Society (ACS)


=> d his nofile

     (FILE 'HOME' ENTERED AT 10:47:15 ON 14 DEC 2006)

     FILE 'HCAPLUS' ENTERED AT 10:48:37 ON 14 DEC 2006
L1             1 SEA WO2000-JP1370/AP

     FILE 'REGISTRY' ENTERED AT 10:53:18 ON 14 DEC 2006
L2             1 SEA 9003-01-4/RN
L3             1 SEA "2-PROPENOIC ACID, 2-METHYL-, HOMOPOLYMER"/CN

     FILE 'HCAPLUS' ENTERED AT 11:02:48 ON 14 DEC 2006
L4         24396 SEA L2 OR L3
L5                 QUE POLYACRYLIC# OR POLYACRYLATE# OR POLYMETHACRYLIC# OR
                   POLYMETHACRYLATE# OR POLY(A)(ACRYLIC# OR ACRYLATE# OR
                   METHACRYLIC# OR METHACRYLATE#) OR (POLY OR POLYM? OR
                   COPOLYM? OR HOMOPOLYM? OR RESIN?)(2A)(ACRYLATE# OR
                   METHACRYLATE# OR ACRYLIC# OR METHACRYLIC#)
L6                 QUE POLYM? OR COPOLYM? OR HOMOPOLYM? OR RESIN?
L7                 QUE CONDUCT? OR COND#
L8                 QUE GRAFT?
L9                 QUE PROTON? OR H OR HYDROGEN#
L10                QUE PERMEA? OR PERFORAT? OR PORO? OR MICROPORO? OR
                   SIEVE? OR PERVIOUS? OR IMPERVIOUS? OR PENETRAT? OR
                   INFILTRAT? OR PERVA? OR SEMIPERMEA?
L11                QUE PERMEA? OR PORO? OR MICROPORO? OR SEMIPERMEA?
L12                QUE ELECTROLY?
L13                QUE MEMBRANE?(3A)L12
L14            404 SEA (L2 OR L3 OR L2/D OR L2/DP OR L3/D OR L3/DP)(L)(L8
                   OR L13)
L15             10 SEA L14 AND L9(2A)L7
L16              7 SEA L15 AND L10
L17                QUE SUBSTRAT? OR SURFACE? OR BASE# OR SUBSTRUCT? OR
                   UNDERSTRUCT? OR UNDERLAY? OR FOUNDATION? OR PANE?
L18        47273 SEA L10(2A)L17
L19            1 SEA L16 AND L18
L20            0 SEA L19 AND L8
L21          153 SEA (L4 OR L5 OR L6)(3A)L8 AND L9(2A)L7
L22            7 SEA L21 AND L18
L23           58 SEA L21 AND L13
L24            3 SEA L22 AND L23
L25           19 SEA L23 AND L10
L26            4 SEA L22 NOT L24
L27           16 SEA L25 NOT (L24 OR L26)
L28                QUE INORG# OR INORGANIC?
L29                QUE CERAMIC? OR GLASS?
L30                QUE (HEAT?(2A)(RESIST? OR REPEL?))(3A)L6
L31            2 SEA (L24 OR L26 OR L27) AND (L28 OR L29 OR L30)
L32                QUE MONOMER?
L33                QUE (FILL? OR FULFILL? OR BOUND? OR EMBED? OR INLAY? OR
                   INSERT? OR PLUNG?)(5A)L10
L34                QUE (FILL? OR FULFILL? OR BOUND? OR EMBED? OR INLAY? OR
```

```
              INSERT? OR PLUNG?)(3A)L17
L35          121 SEA L13 AND L32 AND L6 AND L9(2A)L7
L36            7 SEA L35 AND (L33 OR L34)
L37            1 SEA L36 AND (L28 OR L29 OR L30)
L38            0 SEA L36 AND L8(2A)L6
L39            7 SEA L36 OR L37
L40              QUE FUEL?(2A)(CELL OR CELL#)
L41              QUE SOL#
L42              QUE ELECTROD##
L43         3138 SEA L40 AND L41 AND L42
L44          377 SEA L43 AND L13
L45           11 SEA L44 AND (L33 OR L34)
L46           10 SEA L45 AND L6
L47          423 SEA L13 AND L10 AND L9(2A)L7
L48          346 SEA L47 AND L6
L49           41 SEA L48 AND (L33 OR L34)
L50           11 SEA L49 AND (L28 OR L29)
L51            4 SEA L50 AND L29
L52           19 SEA L47 AND L8(2A)L6
L53            1 SEA L52 AND (L33 OR L34)
L54              QUE (NEGATIVE? OR NEG#)(A)ELECTROD## OR ANOD##
L55              QUE (POSITIVE? OR POS#)(A)ELECTROD## OR CATHOD##
L56            8 SEA L40 AND L54 AND L55 AND L10 AND L8(2A)L6
L57            0 SEA L56 AND (L33 OR L34)


=> fil hcap
FILE 'HCAPLUS' ENTERED AT 13:24:56 ON 14 DEC 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2006 AMERICAN CHEMICAL SOCIETY (ACS)


=> d l24 ibib abs hitstr hitind 1-3

L24  ANSWER 1 OF 3  HCAPLUS  COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER:         2006:443108  HCAPLUS
DOCUMENT NUMBER:          144:471407
TITLE:                    Proton-conductive
                          electrolyte membranes for
                          polymer-electrolyte fuel cells, and
                          same fuel cells
INVENTOR(S):              Emori, Hideyuki; Yamamoto, Kazunari
PATENT ASSIGNEE(S):       Nitto Denko Corp., Japan
SOURCE:                   Jpn. Kokai Tokkyo Koho, 12 pp.
                          CODEN: JKXXAF
DOCUMENT TYPE:            Patent
LANGUAGE:                 Japanese
FAMILY ACC. NUM. COUNT:   1
PATENT INFORMATION:

     PATENT NO.           KIND   DATE        APPLICATION NO.        DATE
     ---------------      ----   --------    --------------------
     --------
     JP 2006120510         A2    20060511    JP 2004-308150
                                                                   200410
                                                                   22
PRIORITY APPLN. INFO.:                       JP 2004-308150
```

200410
22

AB The **electrolyte membranes** are constituted by **porous substrates** and **proton-conductive** polymers filled in the pores. The **porous substrates** are composed of (A) 50-99 weight% of first polymers containing polyolefins with weight-average mol. weight of ≥500,000, and optionally thermoplastic elastomers and/or **graft copolymers**, and (B) 1-50 weight% of second polymers bearing double bond on main- or side chains whose ≥1% is substituted with epoxy groups. The membranes show high **proton conductivity** and inhibit methanol permeation.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 39

ST **proton conductive** polymer **electrolyte membrane** fuel cell; polyolefin blend polymer electrolyte fuel cell

IT Styrene-butadiene rubber, uses
RL: DEV (Device component use); USES (Uses)
(block, triblock, epoxidized, Epofriend A 1005, in **porous substrates** of **membranes**; in **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT Polyolefins
Thermoplastic rubber
RL: DEV (Device component use); USES (Uses)
(in **porous substrates** of **membranes**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT Fuel cells
(polymer **electrolyte**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT Polyelectrolytes
(**proton-conductive**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(in **porous substrates** of **membranes**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT 69824-22-2P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**proton conductor**, in pores of **porous substrates**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT 694491-73-1D, block, triblock, epoxidized 694491-73-1D, epoxidized
RL: DEV (Device component use); USES (Uses)
(styrene-butadiene rubber, Epofriend A 1005, in **porous substrates** of **membranes**; in **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

L24 ANSWER 2 OF 3 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:411921 HCAPLUS
DOCUMENT NUMBER: 143:98404

TITLE: Physico-chemical study of sulfonated polystyrene pore-filled **electrolyte membranes** by electrons induced grafting
AUTHOR(S): Ismail, A. F.; Zubir, N.; Nasef, M. M.; Dahlan, K. M.; Hassan, A. R.
CORPORATE SOURCE: Membrane Research Unit, Faculty of Chemical and Natural Resources Engineering, Universiti Teknologi Malaysia, Skudai, Johor, 81310, Malay.
SOURCE: Journal of Membrane Science (2005), 254(1-2), 189-196
CODEN: JMESDO; ISSN: 0376-7388
PUBLISHER: Elsevier B.V.
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Pore-filled polymer **electrolyte membranes** have been prepared as a potential proton exchange membrane by radiation induced grafting using simultaneous technique. The **porous substrate** films were grafted in a subsequent step after flooding the membranes pores with styrene monomer. The grafted films were then sulfonated in a post-grafting reactions. The influence of grafting conditions, i.e. irradiation dose and monomer concentration in correlation with the grafting yield (Y) have been investigated. The results showed that the grafting yield is increased for both conditions. The resulting membranes were then characterized by evaluating their physico-chemical properties such as ion exchange capacity, water uptake and **proton conductivity** as a function of grafting yield. The overall results showed that polystyrene grafts is successfully anchored within the pores of PTFE films during grafting and subsequently transformed into hygroscopic proton exchange regions after being sulfonated. The measured conductivity of the sulfonated polystyrene pore-filled **electrolyte** PTFE **membranes** achieved were approx. within the magnitude of 10-3 and 10-2 S cm-1 at room temperature and at higher operating temperature, resp.

CC 38-3 (Plastics Fabrication and Uses)

IT **Polymerization**
(**graft**, radiochem.; physico-chemical study of sulfonated polystyrene-polytetrafluoroethylene porous membranes prepared by electrons induced grafting)

IT Ionic **conductivity**
(**proton**; physico-chemical study of sulfonated polystyrene-polytetrafluoroethylene porous membranes prepared by electrons induced grafting)

IT 109211-02-1DP, Styrene-tetrafluoroethylene **graft copolymer**, sulfonated 109211-02-1P, Styrene-tetrafluoroethylene **graft copolymer**
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(physico-chemical study of sulfonated polystyrene-polytetrafluoroethylene porous membranes prepared by electrons induced grafting)

REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L24 ANSWER 3 OF 3 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:216383 HCAPLUS
DOCUMENT NUMBER: 136:234757
TITLE: **Electrolyte membrane**, fuel cell, and manufacture of the membrane and the

cell
INVENTOR(S): Yamaguchi, Takeo; Nakao, Shinichi
PATENT ASSIGNEE(S): Foundation for Scientific Technology Promotion, Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002083612	A2	20020322	JP 2000-272203	20000907
PRIORITY APPLN. INFO.:			JP 2000-272203	20000907

AB The **electrolyte membrane** has a **H conductive** polymer filled in the pores of a MeOH- and H2O-non-swellable **porous substrate.** The membrane is prepared by bonding a 1st polymer with its 1 end to the pores of a **porous substrate**, swell resistant to organic solvent or water, and bonding a 2nd polymer to the other end of the 1st polymer; where the 2 polymers are the same or different but are both **H conductive.** The fuel cell has the **electrolyte membrane** between a cathode and an anode, and is prepared by forming a 1st electrode from a sol, forming a porous film on the electrode, forming an **electrolyte membrane** by the above method using the porous film, and applying a 2nd electrode on the **electrolyte membrane.**

IC ICM H01M008-02
ICS C08J009-40; H01M008-10; C08L027-18; C08L079-08
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST fuel cell **proton conducting** polymer **electrolyte membrane** manuf
IT Fuel cell electrolytes
(structure and manufacture of **proton conducting polymer grafted** in porous Teflon **membranes** for fuel cell **electrolytes**)
IT Fluoropolymers, uses
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(structure and manufacture of **proton conducting polymer grafted** in porous Teflon **membranes** for fuel cell **electrolytes**)
IT 9002-84-0, Teflon
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(structure and manufacture of **proton conducting polymer grafted** in porous Teflon **membranes** for fuel cell **electrolytes**)
IT 79-10-7, Acrylic acid, uses 1184-84-5, Vinylsulfonic acid
RL: MOA (Modifier or additive use); USES (Uses)

(structure and manufacture of **proton conducting** **polymer grafted** in porous Teflon **membranes** for fuel cell **electrolytes**)

=> d l26 ibib abs hitstr hitind 1-4

L26 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:1001330 HCAPLUS
TITLE: **Proton conducting** membrane using multi-layer acid-base complex formation on porous PE film
AUTHOR(S): Cho, M. S.; Son, H. D.; Nam, J. D.; Suh, S. J.; Lee, Y.
CORPORATE SOURCE: Department of Chemical Engineering, Sungkyunkwan University, Suwon, 440-746, S. Korea
SOURCE: Journal of Membrane Science (2006), 284(1+2), 155-160
CODEN: JMESDO; ISSN: 0376-7388
PUBLISHER: Elsevier B.V.
DOCUMENT TYPE: Journal
LANGUAGE: English
AB A new type of **proton conducting** membrane was fabricated by multi-layer acid-base complex formation on a porous PE-g-PSS film. Polystyrene was initially grafted on a **porous** PE **substrate** using a supercrit. carbon dioxide (s.c.-CO2) medium, and the grafted polystyrene was subsequently sulfonated to yield the PE-g-PSS membrane. The multi-layer acid base complex structure was obtained by the repetitive alternating deposition of poly(vinylimidazole) and poly(2-acrylamido-2-methyl-1-propane-sulfonic acid) on the PE-g-PSS film. The multi-layer acid-base complex structure was designed to suppress methanol crossover due to the more compact pore-filling structure as well as to control the hydrophilicity. As expected, the methanol permeability of the optimized multi-layer membrane was much lower, however, the **proton conductivity** of the membrane was higher than that of Nafion 115.
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 37, 76
ST membrane porous film PE styrene DVB surface grafting sulfonation; polyvinyl imidazole polyacrylamidomethyl propanesulfonic acid multilayer **proton cond** morphol
IT Membranes, nonbiological
(composite; **proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT Permeability
(methanol permeability of **proton conducting** multi layer membrane)
IT Plastic films
(porous; **proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT Ion exchange
Multilayers
Polymer morphology
Thickness
Wetting
(**proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT Ionic **conductivity**
(**proton**; **proton conducting** membrane

using multi layer acid-base complex formation on porous PE film)
IT 7732-18-5, Water
RL: NUU (Other use, unclassified); USES (Uses)
(absorption; **proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT 78-67-1, AIBN
RL: CAT (Catalyst use); USES (Uses)
(polymerization catalyst; **proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT 67-56-1, Methanol
RL: NUU (Other use, unclassified); USES (Uses)
(**proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT 7790-94-5DP, Chlorosulfonic acid, polyethylene-surface grafted styrene-divinylbenzene sulfonation products
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
(**proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT 25232-42-2, Polyvinylimidazole 27119-07-9, poly(2-acrylamido-2-methyl-1-propanesulfonic acid)
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT 9002-88-4, Polyethylene
RL: MSC (Miscellaneous); TEM (Technical or engineered material use); USES (Uses)
(substrate, surface grafted; **proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT 124-38-9, Carbon dioxide
RL: NUU (Other use, unclassified); USES (Uses)
(supercrit.; **proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
IT 112529-11-0DP, Ethylene-styrene-divinylbenzene **graft copolymer**, sulfonated
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)
(surface **graft**; **proton conducting** membrane using multi layer acid-base complex formation on porous PE film)
REFERENCE COUNT: 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

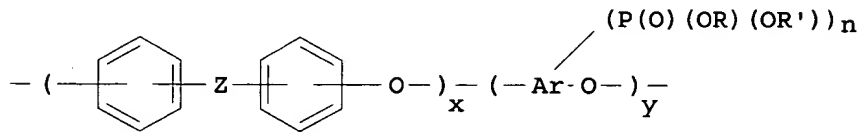
L26 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2003:554038 HCAPLUS
DOCUMENT NUMBER: 139:119905
TITLE: **Proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators
INVENTOR(S): Sasaki, Shigeru; Yashiro, Arihiro; Hidaka, Yasuaki; Taniguchi, Yakumi
PATENT ASSIGNEE(S): Sumitomo Chemical Company Limited, Japan

SOURCE: Fr. Demande, 36 pp.
CODEN: FRXXBL
DOCUMENT TYPE: Patent
LANGUAGE: French
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FR 2834716	A1	20030718	FR 2003-385	20030115
FR 2834716	B1	20050311		
JP 2003206402	A2	20030722	JP 2002-5796	20020115
JP 2003282096	A2	20031003	JP 2002-369739	20021220
CA 2416580	AA	20030715	CA 2003-2416580	20030114
DE 10301063	A1	20030904	DE 2003-10301063	20030114
US 2003166824	A1	20030904	US 2003-341500	20030114
US 6828407	B2	20041207		
GB 2386375	A1	20030917	GB 2003-810	20030114
GB 2386375	B2	20050713		
CN 1432604	A	20030730	CN 2003-101587	20030115

PRIORITY APPLN. INFO.: JP 2002-5796 A 20020115
JP 2002-5797 A 20020115

OTHER SOURCE(S): MARPAT 139:119905
GI



I

AB **Proton-conducting** polymer membranes, especially for fuel cells, are phosphonic acid-containing polyether-polyketones or polyether-polysulfones, of general structure I, in which Z = -SO2-

or -C(:O)-; x and y = 0.01-0.99 (x + y = 1); -Ar- is a C4-18-arylene and can contain heteroatoms; n ≤8; and R and R' = H or alkyl, in addition to at least one other component selected from phosphoric acid (or derivative) and a polymer electrolyte. The polymer has a **proton conductivity** of ≥1 + 10-4 S/cm. The phosphoric acid derivative has the general formula O:P(OR2)k(OH)3-k, in which R2 = C1-6-alkyl or an aryl group, and; k = 0-2. The phosphonic acid groups are **grafted** onto the **polymer** by bromination with N-bromosuccinimide, followed by reaction with tri-Et phosphite in the presence of NiCl2.

IC ICM C08L071-12
ICS C08K005-521; C08J005-22; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell **proton conducting** membrane polysulfone polyether; sulfonated polysulfone polyether fuel cell membrane; polyketone polyether fuel cell **proton conducting** membrane

IT Polyketones
Polysulfones, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyether-, aromatic, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polysulfones, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyether-polyoxyphenylene-, aromatic, block, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polyoxyphenylenes
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyether-polysulfone-, aromatic, block, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polyethers, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyketone-, aromatic, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polyethers, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polyoxyphenylene-polysulfone-, aromatic, block, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

IT Polyethers, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(polysulfone-, aromatic, sulfonated, phosphonic acid-containing; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell

separators)
IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(**porous substrates; proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)
IT Fuel cell separators
(**proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)
IT Ionic **conductivity**
(**proton; proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)
IT 122-52-1DP, Triethyl phosphite, reaction products with sulfonated brominated polysulfone-polyethers 25839-81-0DP, Poly(oxy[1,1'-biphenyl]-4,4'-diyloxy-1,4-phenylenesulfonyl-1,4-phenylene), sulfonated, brominated, reaction products with tri-Et phosphite 83094-08-0DP, sulfonated 83094-08-0DP, sulfonated, brominated, reaction products with tri-Et phosphite
RL: DEV (Device component use); PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)
(membranes; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)
IT 13598-36-2DP, Phosphonic acid, aryl and polymeric derivs. 174899-22-0DP, sulfonated
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(membranes; **proton-conducting** sulfonated polysulfone-polyethers and polyketone-polyethers as fuel cell separators)

L26 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1998:393158 HCAPLUS
DOCUMENT NUMBER: 129:128184
TITLE: Electrochemical characterization of PVDF-based **proton conducting** membranes for fuel cells
AUTHOR(S): Lehtinen, T.; Sundholm, G.; Holmberg, S.; Sundholm, F.; Bjornbom, P.; Bursell, M.
CORPORATE SOURCE: Lab. Physical Chem. and Electrochemistry, Helsinki Univ. Tech., FIN-02015, Finland
SOURCE: Electrochimica Acta (1998), 43(12-13), 1881-1890
CODEN: ELCAAV; ISSN: 0013-4686
PUBLISHER: Elsevier Science Ltd.
DOCUMENT TYPE: Journal
LANGUAGE: English
AB The electrochem. characterization of **proton-conducting** membranes prepared by irradiation-induced grafting and subsequent sulfonation of PVDF films has been performed. In particular, measurements of the ionic conductivity, oxygen solubility and diffusion in the membranes are presented, as well as kinetic data for the oxygen reduction reaction in a membranes are presented, as well as performance of these PVDF-g-PSSA membranes in a solid polymer electrolyte fuel cell using a microcathode technique. At sufficient degrees of grafting (>40%) the conductivity reaches 0.1 Scm-1, well above that of Nafion 117 (DuPont). The PVDF-g-PSSA membranes show lower solubilities and higher diffusion coeffs. of oxygen and a higher

water uptake than Nafion 117. The microcathode measurements indicate that those PVDF-g-PSSA membranes which have conductivity higher than that of Nafion 117 may also give improved performance in fuel cell conditiones provided that they have the necessary mech. and chemical stability.

CC 72-2 (Electrochemistry)
Section cross-reference(s): 36, 38, 52, 74

ST **proton conducting** membrane fuel cell electrochem; oxygen soly diffusion microcathode conducting membrane; styrene vinylidene fluoride **graft polymer** membrane

IT Conducting polymers
(PVDF-based **proton conducting** membranes for fuel cells)

IT Stability
(chemical, of PVDF-based **proton conducting** membranes for fuel cells)

IT Films
(elec. conductive; of PVDF-based **proton conducting** membranes for fuel cells)

IT Fuel cells
(electrochem. characterization of PVDF-based **proton conducting** membranes for)

IT Cation exchange membranes
(electrochem. characterization of PVDF-based **proton conducting** membranes for fuel cells)

IT Fluoropolymers, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(electrochem. characterization of PVDF-based **proton conducting** membranes for fuel cells)

IT Reduction kinetics
(electrochem.; of oxygen in contact with PVDF-based **proton conducting** membrane electrode)

IT Electric conductors
(films; of PVDF-based **proton conducting** membranes for fuel cells)

IT Limiting current
(for oxygen reduction for PVDF-based **proton conducting** membranes)

IT Permeation
(gas **permeation** of PVDF-**based proton conducting** membranes for fuel cells)

IT Diffusion
(gas; of oxygen in PVDF-based **proton conducting** membranes)

IT Exchange current (electric)
(in electroredn. of oxygen on platinum in contact with PVDF-based **proton conducting** membrane)

IT Sulfonation
(of PVDF-based **proton conducting** membranes by chlorosulfonic acid in THF)

IT Electrolytic polarization
(of PVDF-based **proton conducting** membranes for fuel cells)

IT Solubility
(of oxygen in PVDF-based **proton conducting** membrane electrode)

IT Reduction, electrochemical
(of oxygen on PVDF-based **proton conducting** membrane electrode)

IT Solid electrolytes
(polymeric; electrochem. characterization of PVDF-based **proton conducting** membranes for fuel cells)
IT Ionic **conductivity**
(**proton**; of PVDF-based **proton conducting** membranes for fuel cells)
IT 109955-91-1D, Styrene-vinylidene fluoride **graft copolymer**, sulfonated
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(electrochem. characterization of PVDF-based **proton conducting** membranes for fuel cells)
IT 66796-30-3, Nafion 117
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(electrochem. characterization of PVDF-based **proton conducting** membranes for fuel cells and comparison with)
IT 7440-06-4, Platinum, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(electrochem. reduction of oxygen on platinum in contact with PVDF-based **proton conducting** membranes)
IT 67-66-3, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(extracting of unreacted monomer from PVDF-based **proton conducting** membranes after radiation-induced **graft copolymn.** with styrene)
IT 7790-94-5, Chlorosulfuric acid
RL: PEP (Physical, engineering or chemical process); PRP (Properties); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(in sulfonation of PVDF-based **proton conducting** membranes for fuel cells)
IT 109-99-9, uses
RL: NUU (Other use, unclassified); PRP (Properties); USES (Uses)
(radiation-induced **graft copolymn.** of polyvinylidene fluoride with styrene in)
IT 100-42-5, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(radiation-induced **graft copolymn.** with polyvinylidene fluoride for formation PVDF-based **proton conducting** membranes for fuel cells)
IT 7782-44-7, Oxygen, properties
RL: PRP (Properties)
(solubility and diffusion in PVDF-based **proton conducting** membranes for fuel cells and electroredn. of oxygen at platinum with OVDF-based **proton conducting** membrane)
IT 7732-18-5, Water, properties
RL: PRP (Properties)
(uptake of PVDF-based **proton conducting** membranes for fuel cells)
REFERENCE COUNT: 32 THERE ARE 32 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1993:584673 HCAPLUS
DOCUMENT NUMBER: 119:184673
TITLE: Materials research aspects of organic solid

proton conductors
AUTHOR(S): Gupta, B.; Buechi, F. N.; Scherer, G. G.; Chapiro, A.
CORPORATE SOURCE: Paul Scherrer Institute, Villigen PSI, CH-5232, Switz.
SOURCE: Solid State Ionics (1993), 61(1-3), 213-18
CODEN: SSIOD3; ISSN: 0167-2738
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Proton exchange membranes were synthesized by simultaneous radiation grafting of styrene onto Teflon-FEP films and subsequent sulfonation. Grafted films and sulfonated membranes were characterized ex-situ, and in-situ in H/O fuel cells. The specific resistivity of the membranes was 2-5 Ω-cm at 20°. Tests in fuel cells indicate that the gas **permeability** and **surface** properties of the membranes need improvement for practical application.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
IT Fuel cells
(hydrogen-oxygen, styrene-Teflon **proton conductor** membranes for)
IT Cation exchangers
(membranes, styrene-Teflon, **proton conductors**, for fuel cells)
IT 25134-67-2D, Styrene-tetrafluoroethylene **copolymer**, sulfonated
RL: USES (Uses)
(**graft**, membranes, resistivity of, for fuel cells)

=> d l27 ibib abs hitstr hitind 1-16

L27 ANSWER 1 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:1069959 HCAPLUS
DOCUMENT NUMBER: 145:422607
TITLE: Process for fabrication of solid polymer **electrolyte membrane** for fuel cell
INVENTOR(S): Takahashi, Norifumi; Ohba, Toshio; Kawada, Nobuo
PATENT ASSIGNEE(S): Shin-Etsu Chemical Co., Ltd., Japan
SOURCE: U.S. Pat. Appl. Publ., 5pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2006228609	A1	20061012	US 2006-401249	200604 11
JP 2006291059	A2	20061026	JP 2005-114427	200504 12

PRIORITY APPLN. INFO.: JP 2005-114427 A 200504 12

AB The present invention relates to a solid polymer **electrolyte membrane** having both of a higher **proton conductivity** and a smaller methanol **permeability**, which can be produced by conducting a **graft polymerization** of a fluororesin thin membrane irradiated with a radiation with a monofunctional monomer and again irradiating the resulting film with a radiation, followed by conducting a **graft polymn** . thereof with a polyfunctional monomer; and a high-performance fuel cell comprising the solid polymer **electrolyte membrane**, a fuel electrode and an air electrode, the solid polymer **electrolyte membrane** being disposed between the fuel electrode and the air electrode.

INCL 429033000; 521027000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell solid polymer **electrolyte membrane**

IT Fuel cells
(direct methanol; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT **Polymerization**
(**graft**; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Electron beams
(irradiation; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Perfluoro compounds
Vinyl compounds, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(perfluoroalkyl vinyl ether polymers, tetrafluoroethylene-; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Ethers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(perfluoroalkyl vinyl, polymers, tetrafluoroethylene-; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Fuel cells
(polymer electrolyte; process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Fuel cell electrolytes
(process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT 116-14-3D, Tetrafluoroethylene, copolymer with perfluoroalkyl vinyl ether 9002-84-0, PTFE 25038-71-5, Ethylene-tetrafluoroethylene copolymer 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)

(process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT 120965-78-8P, Divinylbenzene-styrene **graft copolymer** 197895-58-2P, Ethylene-tetrafluoroethylene-styrene **graft copolymer**
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

IT 67-56-1, Methanol, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(process for fabrication of solid polymer **electrolyte membrane** for fuel cell)

L27 ANSWER 2 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:1065764 HCAPLUS
DOCUMENT NUMBER: 145:400973
TITLE: Membrane-electrode assemblies with **porous** catalyst layers and polymer electrolyte fuel cells using them
INVENTOR(S): Kashino, Hiroshi
PATENT ASSIGNEE(S): Hitachi Maxell Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 17pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006278022	A2	20061012	JP 2005-92235	200503 28
PRIORITY APPLN. INFO.:			JP 2005-92235	200503 28

AB The membrane-electrode assemblies (MEA) have **porous** catalyst layers containing catalysts, **porous** elec. **conductors**, and **proton conductors**, wherein the **proton conductors** are located in at least a part of pores with size ≥0.1 μm of the elec. conductors. Total area of pores with size 0.1-10 μm is ≥10% to that of pores with size ≥10 nm and ≤100 μm. The MEA are manufactured by polymerization of **proton-conductive** monomers in the presence of catalysts and **porous** elec. conductors, or polymerization of proton-nonconductive monomers in the presence of the catalysts and elec. conductors, and introduction of **proton-conductive** groups onto the resulting polymers, and size reduction or granulation of the resulting polymer-elec. conductor composites. Three-phase (catalysts, **porous** elec. **conductors**, and **proton conductors**) interfaces are effectively formed in the catalyst layers without lowering diffusion property of fuels or oxidants.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

IT Graphitized carbon black

RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(Ketjen Black EC, sulfo-containing **graft polymers** ; membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT Catalysts
(electrocatalysts; membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT Polyoxyalkylenes, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers, Nafion; membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT Electric conductors
Fuel cell electrodes
Pore size distribution
(membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT Fuel cells
(polymer **electrolyte**; **membrane**-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT Fluoropolymers, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers, Nafion; membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT Ionomers
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing, Nafion; membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT Ionic **conductors**
(**protonic**; membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT 7440-06-4, Platinum, uses 7440-44-0, Carbon, uses 11134-15-9 12623-53-9 12779-05-4 39339-47-4 51402-57-4
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

IT 100-42-5DP, Styrene, polymer with graphitized carbon black, graft, sulfonated 106-91-2DP, Glycidyl methacrylate, polymer with graphitized carbon black and sodium styrenesulfonate, graft 2695-37-6DP, Sodium p-styrenesulfonate, polymer with graphitized carbon black and glycidyl methacrylate, graft
RL: CAT (Catalyst use); DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(membrane-electrode assemblies with **porous** catalyst layers for polymer electrolyte fuel cells)

L27 ANSWER 3 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:978191 HCAPLUS
DOCUMENT NUMBER: 145:336749
TITLE: **Graft polymer, polymer electrolyte membrane**, method for producing the same, and fuel cell using the same
INVENTOR(S): Takagi, Shigeharu; Higa, Mitsuru

PATENT ASSIGNEE(S): Toyota Jidosha Kabushiki Kaisha, Japan; Yamaguchi University
SOURCE: PCT Int. Appl., 35pp. CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006098484	A2	20060921	WO 2006-JP305627	200603 15
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
JP 2006291161	A2	20061026	JP 2005-254861	200509 02

PRIORITY APPLN. INFO.: JP 2005-75790 A 200503 16
JP 2005-254861 A 200509 02

AB This invention provides a **graft polymer** that has excellent **proton conductivity**, is capable of regulating hydrogen **permeability**, methanol **permeability**, and the like, and can serve as a starting material for a polymer **electrolyte membrane**, which facilitates moisture balance control and efficient operation of a fuel cell. A polymer **electrolyte membrane** composed of such **graft polymer** is also provided. This **graft polymer** comprises a main chain comprising a hydroxyl group-containing **polymer** and a **graft** chain comprising a **polymer** containing a sulfonic acid group-containing monomer (e.g., AMPS).

CC 37-3 (Plastics Manufacture and Processing)
Section cross-reference(s): 52

ST vinyl alc sulfonic acid monomer **graft copolymer electrolyte membrane**

IT **Membranes**, nonbiological
(**electrolyte; graft polymer, polymer electrolyte membrane**, method for producing the same, and fuel cell using the same)

IT Fuel cells
(**graft polymer, polymer**

electrolyte membrane, method for producing the same, and fuel cell using the same)

IT **Electrolytes**
(**membrane; graft polymer**, **polymer electrolyte membrane**, method for producing the same, and fuel cell using the same)

IT 338446-39-2P, 2-Acrylamido-2-methyl-1-propanesulfonic acid-vinyl alcohol **graft copolymer**
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**graft polymer, polymer electrolyte membrane**, method for producing the same, and fuel cell using the same)

L27 ANSWER 4 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:886444 HCAPLUS
DOCUMENT NUMBER: 145:274857
TITLE: Method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells
INVENTOR(S): Takagi, Shigeharu; Kobayashi, Misaki; Saito, Toshiya; Yoshida, Masaru; Asano, Masaharu; Yamaki, Tetsuya
PATENT ASSIGNEE(S): Japan Atomic Energy Agency, Japan; Toyota Jidosha Kabushiki Kaisha
SOURCE: PCT Int. Appl., 41pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006090862	A1	20060831	WO 2006-JP303504	200602 20
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
JP 2006233086	A2	20060907	JP 2005-51525	200502 25

PRIORITY APPLN. INFO.: JP 2005-51525 A 200502 25

AB A functional membrane is provided, which has high functionality combined with the gas barrier performance and mech. strength inherent in a polymer film substrate. In particular, a polymer

electrolyte membrane is provided, which is excellent in terms of high **proton conductivity** and gas barrier performance and is most appropriate to serve as a polymer **electrolyte membrane** for fuel cells. A method for producing a functional membrane is provided, which comprises: a step of ion irradiation, in which active species are generated in a polymer film substrate containing nonconductive inorg. particles by irradiating the polymer film substrate with high-energy heavy ions to the extent of 104/cm2 to 1014/cm2; and a step of **graft polymn** . subsequent to the step of ion irradiation, in which one or more monomers selected from group A consisting of monomers containing useful functional groups are added such that the monomers are **graft polymerized** with the **polymer** film substrate.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell **electrolyte membrane** fabrication

IT Polyimides, uses
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(divinylbenzene-methylstyrene **copolymer grafted** on; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Polymers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(films; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Membranes, nonbiological
(functional; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT **Polymerization**
(**graft**; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Particles
(inorg.; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Electron beams
Plasma
(irradiation; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Fuel cell electrolytes
Gamma ray
Ion bombardment
Permeability
(method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Fluoropolymers, uses
Mordenite-type zeolites
RL: DEV (Device component use); USES (Uses)
(method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Fuel cells
(polymer electrolyte; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Hydrocarbons, uses
RL: DEV (Device component use); USES (Uses)
(polymers; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)

IT Ionic **conductivity**

(**proton**; method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)
IT 7782-44-7, Oxygen, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)
IT 1314-23-4, Zirconia, uses 1344-28-1, Alumina, uses 7631-86-9, Silica, uses
RL: DEV (Device component use); USES (Uses)
(method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)
IT 9003-53-6DP, sulfonated, sodium salt 39317-52-7DP, grafted on polyimide 239477-89-5P, Divinylbenzene-styrene-vinylidene fluoride **graft copolymer** 907191-17-7P 907191-18-8P 907191-19-9P
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(method of fabrication of functional **membrane** and **electrolyte membrane** for fuel cells)
REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 5 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:881536 HCAPLUS
DOCUMENT NUMBER: 145:420077
TITLE: Single radiation-induced grafting method for the preparation of two proton- and lithium ion-conducting membranes
AUTHOR(S): Nasef, Mohamed Mahmoud; Saidi, Hamdani
CORPORATE SOURCE: Business and Advanced Technology Centre (BATC), Universiti Teknologi Malaysia, Kuala Lumpur, 54100, Malay.
SOURCE: Macromolecular Materials and Engineering (2006), 291(8), 972-983
CODEN: MMENFA; ISSN: 1438-7492
PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Two distinct types of polymer **electrolyte membranes** for **conducting protons** and lithium ions have been prepared by a radiation-induced grafting method. The polymer electrolyte precursor (PVDF-g-PS) is obtained by the simultaneous grafting of styrene onto poly(vinylidene fluoride) (PVDF) followed by one of two specific treatments. This includes sulfonation with a chlorosulfonic acid/dichloromethane mixture to obtain **proton** (**H+**)-**conducting** membranes, or activation with LiPF6/EC/DC liquid electrolyte to obtain lithium ion (Li+)-conducting membranes. The chemical structure of the obtained **electrolyte membranes** is verified by FT-IR spectroscopy. Differential scanning calorimetry is used to examine the changes in the crystallinity and the thermal properties of both **electrolyte membranes** during the preparation process. The thermal stability of both **electrolyte membranes** is also evaluated using thermal gravimetric anal. The obtained polymer **electrolyte membranes** achieve superior conductivity values: 1.61 + 10-3 S · cm-1 for Li+ and 5.95 + 10-2 S · cm-1 for H+ at room temperature at a

polystyrene content of 50%. The results of this work suggest that high quality **H+**- and Li+-**conducting** membranes can be obtained using a single radiation-induced grafting method.

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 35, 37, 76

IT **Polymerization**
(**graft**, radiochem.; single radiation-induced grafting for preparation of two proton- and lithium ion-conducting membranes)

IT Battery electrolytes
Crystallinity
Crystallization temperature
Fuel cells
Fusion enthalpy
Ion exchange
Ionic conductivity
Polymer electrolytes
Porosity
Swelling, physical
(single radiation-induced grafting for preparation of two proton- and lithium ion-conducting membranes)

IT 7790-94-5DP, Chlorosulfonic acid, reaction products with styrene-vinylidene fluoride **graft copolymer**
21324-40-3DP, reaction products with styrene-vinylidene fluoride **graft copolymer** 109955-91-1DP, Styrene-Vinylidenefluoride **graft copolymer**, reaction products with chlorosulfonic acid or with lithium hexafluorophosphate
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)
(single radiation-induced **grafting** for preparation of two proton- and lithium ion-conducting membranes)

REFERENCE COUNT: 47 THERE ARE 47 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 6 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:849354 HCAPLUS
DOCUMENT NUMBER: 145:274826
TITLE: **Electrolyte membrane**, its manufacture, fuel cell, and electronic apparatus
INVENTOR(S): Hasegawa, Aino; Kimura, Okitoshi; Tanaka, Masaharu
PATENT ASSIGNEE(S): Ricoh Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 14pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006221873	A2	20060824	JP 2005-32179	200502 08

PRIORITY APPLN. INFO.: JP 2005-32179 200502

AB The **electrolyte membrane** contain nonionic copolymers and phosphate group-containing resins in a **porous** membrane and is manufactured by impregnating a **porous** membrane with liquid containing nonionic copolymers and phosphate group-containing monomers and polymerizing the monomers. The fuel cell has the **electrolyte membrane**, and the electronic apparatus uses the cell. The **electrolyte membrane** shows high **proton conductivity** and low fuel crossover.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76

ST **electrolyte membrane** nonionic copolymer phosphate resin fuel cell; electronic app fuel cell **electrolyte membrane**

IT Electric apparatus
Fuel cell **electrolytes**
Fuel cells
(**electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)

IT Fluoropolymers, uses
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(graft; **electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)

IT Ionic **conductors**
(**protonic**; **electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)

IT 25190-89-0P, Propylene fluoride-tetrafluoroethylene-vinylidene fluoride copolymer 51131-63-6P 110671-41-5P 906088-87-7P, tert-Butylperoxyallyl carbonate-chlorofluoroethylene-vinylidene fluoride **graft copolymer**
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)

IT 64-17-5, Ethanol, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fuel; **electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)

IT 9003-07-0, Polypropylene
RL: TEM (Technical or engineered material use); USES (Uses)
(**porous**, **membrane** matrix; **electrolyte membrane** containing nonionic copolymers and phosphate-containing resins and its manufacture for fuel cell used in electronic apparatus)

L27 ANSWER 7 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:838551 HCAPLUS
DOCUMENT NUMBER: 145:400617
TITLE: Polymer **electrolyte membranes** for the direct methanol fuel cell: a review
AUTHOR(S): Deluca, Nicholas W.; Elabd, Yossef A.
CORPORATE SOURCE: Department of Chemical and Biological Engineering, Drexel University, Philadelphia, PA, 19104, USA

SOURCE: Journal of Polymer Science, Part B: Polymer Physics (2006), 44(16), 2201-2225
CODEN: JPBPEM; ISSN: 0887-6266
PUBLISHER: John Wiley & Sons, Inc.
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English

AB A review. The direct methanol fuel cell (DMFC) has the potential to replace lithium-ion rechargeable batteries in portable electronic devices, but currently experiences significant power d. and efficiency losses due to high methanol crossover through polymer **electrolyte membranes** (PEMs). Numerous publications document the synthesis and characterization of new PEMs for the DMFC. This article reviews this research, transport phenomena in PEMs, and exptl. techniques used to evaluate new PEMs for the DMFC. Although many PEMs do not show significant improvements over Nafion, the benchmark PEM in DMFCs, exptl. results show that several new PEMs exhibit lower methanol crossover at similar **proton conductivities** and/or higher DMFC power densities. These results and recommendations for future research are discussed.

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 36

ST review polymer **electrolyte membrane** methanol fuel cell doping cond

IT Ionomers
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(acrylic, sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polyimides, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(aromatic, sulfo- containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polymers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(co-, block and random; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Membranes, nonbiological
(composite; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Fluoropolymers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(composites and IPNs; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Heteropoly acids
RL: DEV (Device component use); USES (Uses)
(dopants; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Electroosmosis
(drag; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Membranes, nonbiological
(elec. conductive; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)

(fluorine- and sulfo-containing, ionomers, benchmark **membranes**; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Ionomers
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(fluoropolymers, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT **Polymers**, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**graft**; of **polymer electrolyte membranes** for direct methanol fuel cell)

IT Fluoropolymers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(ionomers, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Coating process
(metalization, sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT **Permeability**
(of membranes to methanol; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT **Permeation**
(of methanol; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Ceramers
Fillers
Fuel cell separators
Interpenetrating polymer networks
Polyelectrolytes
Polymer **electrolytes**
(of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polymer blends
RL: DEV (Device component use); USES (Uses)
(of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Absorption
(of water; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polyphosphazenes
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(phenoxy, sulfo- containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polyimides, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(polybenzimidazole-, sulfo- containing; of polymer **electrolyte membranes** for direct methanol fuel cell)

IT Polyketones
Polysulfones, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(polyether-, ionomers, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel

cell)
IT Polysulfones, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(polyether-, phthalazinone group-containing, polyketone-, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Polybenzimidazoles
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(polyimide-, sulfo- containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Polyethers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(polyketone-, ionomers, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Fuel cells
(polymer **electrolyte**, new **membranes** for; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Sulfonic acids, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(polymers, sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Fluoropolymers, uses
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers, benchmark **membranes**; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Ionomers
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing, benchmark **membranes**; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Polyethers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(polysulfone-, ionomers, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Polyethers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(polysulfone-, phthalazinone group-containing, polyketone-, sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Ionic **conductivity**
(**proton**; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Doping
(sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Sulfonic acids, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES

(Uses)
(sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Ionomers
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Polymers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(sulfo-containing, sulfo- group-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT Ionomers
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(sulfo-containing; of polymer **electrolyte membranes** for direct methanol fuel cell)
IT 67-56-1, Methanol, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(of polymer **electrolyte membranes** for direct methanol fuel cell)
REFERENCE COUNT: 180 THERE ARE 180 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 8 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:689857 HCAPLUS
DOCUMENT NUMBER: 145:317869
TITLE: Preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells
AUTHOR(S): Chen, Jinhua; Asano, Masaharu; Yoshida, Masaru; Maekawa, Yasunari
CORPORATE SOURCE: Takasaki Radiation Chemistry Research Institute, Japan Atomic Energy Agency (JAEA), Takasaki, Gunma, 370-1292, Japan
SOURCE: Journal of Applied Polymer Science (2006), 101(4), 2661-2667
CODEN: JAPNAB; ISSN: 0021-8995
PUBLISHER: John Wiley & Sons, Inc.
DOCUMENT TYPE: Journal
LANGUAGE: English
AB A new polymer **electrolyte membrane** prepared by radiation grafting of vinyltoluene into poly(ethylene-co-tetrafluoroethylene) (ETFE) film and subsequent sulfonation was developed for application in fuel cells. The effect of grafting condition on the degree of grafting was studied. The degree of grafting can be controlled over a wide range. The grafted films were sulfonated in a chlorosulfonic acid solution to obtain the polymer **electrolyte membranes**, which were characterized with respect to their use in fuel cells. The substituted Me group on the vinyltoluene can improve the chemical stability of the resulting membranes, and the crosslinked ETFE-g-poly(vinyltoluene-co-divinylbenzene) membranes can be proposed for the future development of alternative low-cost and high-performance membranes for fuel cells.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 35, 38

ST sulfonated ethene tetrafluoroethene vinyltoluene **grafted copolymer** membrane fuel cell; polymer **electrolyte** fuel cell **membrane** radiation crosslinking grafting cond

IT Vinyl compounds, preparation
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(aryl, **polymers**, fluoropolymers, **graft**, sulfonated; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT Vinyl compounds, preparation
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(aryl, **polymers**, fluoropolymers, **graft**; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT **Polymerization**
(**graft**, photochem., γ-ray- induced, effect on polymer electrolyte properties; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT **Permeability**
(of membranes to methanol; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT Vinyl compounds, preparation
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(**polymers**, aromatic, fluoropolymers, **graft**, sulfonated; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT Vinyl compounds, preparation
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(**polymers**, aromatic, fluoropolymers, **graft**; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT Ionic **conductivity**
(**proton**; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT Aromatic compounds
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(vinyl, **polymers**, fluoropolymers, **graft**, sulfonated; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT Aromatic compounds
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(vinyl, **polymers**, fluoropolymers, **graft**; preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT 197895-58-2DP, Ethylene-tetrafluoroethylene-styrene **graft copolymer**, sulfonated 898820-80-9DP, sulfonated 908610-48-0DP, sulfonated 908610-49-1DP, sulfonated
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)
(preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)

IT 197895-58-2P, Ethylene-tetrafluoroethylene-styrene **graft**

copolymer 898820-80-9P 908610-48-0P 908610-49-1P
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(preparation and properties of sulfonated ETFE-g-polyvinyltoluene membranes for application in fuel cells)
REFERENCE COUNT: 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 9 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:606811 HCAPLUS
DOCUMENT NUMBER: 145:274735
TITLE: Composite Gel-Type Proton Membranes
AUTHOR(S): Navarra, M. A.; Fernicola, A.; Panero, S.; Scrosati, B.
CORPORATE SOURCE: Department of Chemistry, University of Rome "La Sapienza", Rome, 00185, Italy
SOURCE: Journal of the Electrochemical Society (2006), 153(7), A1284-A1289
CODEN: JESOAN; ISSN: 0013-4651
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English
AB This paper reviews the properties of a new **microporous**, composite **proton-conducting** gel membrane, formed by swelling with aqueous acid solns. suitable polymer matrixes containing dispersed ceramic fillers. These membranes have a high and stable **conductivity**, a **proton** transport intrinsically provided by the absorbed acid solution not strictly influenced by the external humidity level, and a projected very low cost. Tests in a hydrogen-air laboratory cell also demonstrate that the membranes are basically suitable for application in polymer electrolyte fuel cells.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST composite gel **proton conducting membrane** fuel cell polymer **electrolyte**
IT Cation exchange membranes
Fuel cell electrolytes
Permeability
Polymer electrolytes
(composite gel-type proton membranes)
IT Stability
(oxidative, of **proton conducting** membranes; composite gel-type proton membranes)
IT Ionic **conductivity**
(**proton**, of gelled composite membranes and time-stability of; composite gel-type proton membranes)
IT 906640-04-8DP, Glutaraldehyde-vinyl acetate **graft copolymer**, hydrolyzed
RL: DEV (Device component use); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(composites with 4-ethylbenzenesulfonyl -modified silica, gels with sulfuric acid solution; composite gel-type proton membranes)
REFERENCE COUNT: 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 10 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:519079 HCAPLUS
DOCUMENT NUMBER: 145:170629
TITLE: Determination of the physicochemical characteristics and electrical performance of post-sulfonated and grafted sulfonated derivatives of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell
AUTHOR(S): Le Ninivin, C.; Balland-Longeau, A.; Demattei, D.; Palmas, P.; Saillard, J.; Coutanceau, C.; Lamy, C.; Leger, J. M.
CORPORATE SOURCE: Laboratoire de Materiaux Organiques et Dielectriques et de Caracterisations Physico-Chimiques, Commissariat a l'Energie Atomique Le Ripault, Monts, 37260, Fr.
SOURCE: Journal of Applied Polymer Science (2006), 101(2), 944-952
CODEN: JAPNAB; ISSN: 0021-8995
PUBLISHER: John Wiley & Sons, Inc.
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Poly(para-phenylene)s (PPPs) are an interesting class of rigid-rod polymers that have excellent thermal and mech. properties. Because of their high degree of crystallinity and lower **permeability** to methanol, PPPs are insol. and infusible. A number of methods were developed to synthesize substituted sulfonated PPPs bearing lateral chains to improve their solubility A comparison of the physicochem. properties of three PPP-based polymers is made with respect to Nafion membranes. One of these polymers was prepared with the post-sulfonation method, and the other two were made with a new method of grafting developed in the Commissariat a l'Energie Atomique laboratory (a **grafted** sulfonated PPP **polymer** and a **grafted** perfluorinated sulfonated **polymer**). The sulfonated PPP polymers were examined for their mech. properties, small-angle x-ray scattering, water absorption, **proton conductivity**, and methanol **permeability**. Relations between structures and properties were also studied. Performances in fuel-cell tests were also studied.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 36, 38

ST characterization sulfonated grafted polyphenylene **proton conducting** membrane; polymer **electrolyte membrane** fuel cell methanol **permeability** sulfonated polyphenyl

IT Ion exchange
(capacity for each membrane; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Crystallinity
Fuel cell separators
Ion exchange membranes
Permeability
Polyelectrolytes
Thermal stability
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Membranes, nonbiological
(elec. conductive; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(fluorine- and sulfo-containing, ionomers; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Open circuit potential
(of assembled fuel cells; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Microstructure
(of membranes; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Polyphenyls
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)
(plain and sulfonated; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Fuel cells
(polymer electrolyte; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Ionomers
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Electric energy
(power d. of assembled fuel cells; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new

proton-conducting membranes for direct methanol fuel cell)

IT Ionic **conductivity**
(**proton**; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT Polyimides, uses
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(sulfonated; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT 7732-18-5, Water, processes
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(absorption; determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT 67-56-1, Methanol, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT 150385-13-0P, Poly(benzoyl-1,4-phenylene) 154100-93-3DP, Poly[(4-phenoxybenzoyl)-1,4-phenylene], sulfonated 900792-50-9DP, 4''-sulfonated and 4''-(1,1,2,2-tetrafluoro-2-sulfoethoxy) derivs.
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT 66796-30-3, Nafion 117
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT 77950-55-1, Nafion 115
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting** membranes for direct methanol fuel cell)

IT 163294-14-2, Nafion 112
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(determination of physicochem. characteristics and elec. performance of post-sulfonated and grafted sulfonated derivs. of poly(para-phenylene) as new **proton-conducting**

membranes for direct methanol fuel cell)
REFERENCE COUNT: 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 11 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:311777 HCAPLUS
DOCUMENT NUMBER: 145:11211
TITLE: Development of fluoropolymer **electrolyte membranes** for fuel cell applications by the γ-ray induced crosslinking and **graft polymerization** methods
AUTHOR(S): Sawada, Shin-ichi; Yamaki, Tetsuya; Asano, Masaharu; Yoshida, Masaru
CORPORATE SOURCE: Japan Atomic Energy Agency, Watanuki, Takasaki, 370-1292, Japan
SOURCE: Kobunshi Ronbunshu (2006), 63(3), 149-159
CODEN: KBRBA3; ISSN: 0386-2186
PUBLISHER: Kobunshi Gakkai
DOCUMENT TYPE: Journal
LANGUAGE: Japanese
AB Fluoropolymer **electrolyte membranes** for direct methanol fuel cells (DMFC) were developed by combining the γ-ray-induced crosslinking with **graft polymn**. Styrene grafting into crosslinked PTFE films and subsequent sulfonation led to the **electrolyte membranes** exhibiting higher **proton conductivity** and lower methanol **permeability** compared to those of Nafion. Such high performances were considered to originate from the low water uptake due to the crosslinking structure. As a second step, two styrene derivative monomers possessing the hydrophobic hydrocarbon groups on the aromatic rings and two different crosslinkers were **graft-copolymd.** instead of styrene into poly(ethylene-co-tetrafluoroethylene) (ETFE) films, in which radiation crosslinking occurred at room temperature The sulfonated **electrolyte membranes** were obtained by the γ-ray crosslinking after the four-component grafting, showing six times higher oxidation resistance compared to the conventional styrene-divinylbenzene grafted ones, and methanol **permeability** being ten times lower than that of Nafion. This study revealed the applicability of radiation-processing technol. to the research and development of **electrolyte membranes** for PEFC applications.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST fluoropolymer styrene **graft polymn** sulfonation fuel cell electrolyte; polymer electrolyte sulfonated fluoropolymer gamma ray crosslinking; direct methanol fuel cell sulfonated fluoropolymer electrolyte
IT Fuel cells
(direct methanol; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)
IT Sulfonation
(of crosslinked fluoropolymers; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)
IT Fuel cell electrolytes
Fuel cell separators
(polymer electrolytes; sulfonated crosslinked fluoropolymers as

polymer **electrolyte membranes** for direct-methanol fuel cells)

IT Ionic **conductivity**
(**proton**, of sulfonated crosslinked fluoropolymers; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)

IT Crosslinking
(radiochem., of fluoropolymers; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)

IT 109211-02-1DP, Styrene-tetrafluoroethylene **graft copolymer**, sulfonated 496068-47-4DP, sulfonated 886532-60-1DP, sulfonated 888319-24-2DP, sulfonated 888319-25-3DP, sulfonated
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(**electrolyte membrane**; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)

IT 67-56-1, Methanol, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(**permeability** of; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)

IT 25038-71-5P, Ethylene-tetrafluoroethylene copolymer
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)
(synthesis and γ-ray crosslinking of; sulfonated crosslinked fluoropolymers as polymer **electrolyte membranes** for direct-methanol fuel cells)

L27 ANSWER 12 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:258024 HCAPLUS
DOCUMENT NUMBER: 142:484674
TITLE: **Grafted polymer electrolyte membrane** for direct methanol fuel cells
AUTHOR(S): Shen, M.; Roy, S.; Kuhlmann, J. W.; Scott, K.; Lovell, K.; Horsfall, J. A.
CORPORATE SOURCE: School of Chemical Engineering and Advanced Materials, University of Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, UK
SOURCE: Journal of Membrane Science (2005), 251(1-2), 121-130
CODEN: JMESDO; ISSN: 0376-7388
PUBLISHER: Elsevier B.V.
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The performance of direct methanol fuel cells (DMFC) with radiation **grafted polymer electrolyte membranes** (PEM) is reported. The membranes used poly ethylene-tetrafluoroethylene (ETFE), poly vinylidene fluoride (PVDF) and low-d. polyethylene (LDPE) as base polymer films. The base **polymer** films were **grafted** with polystyrene sulfonic acid (PSSA) as **proton-conducting** groups. The effects of varying the degree of grafting (DOG) and the membrane thickness, which change the ion conductivity and methanol

permeability, has a strong influence on methanol crossover of the DMFC and the performance of the DMFC. Typically, increasing the degree of grafting increases the ion conductivity and the methanol crossover. By adjusting the degree of grafting and the membrane thickness, membranes with suitable conductivity and low methanol crossover were produced. The DMFC performance with such membranes was superior to that of with Nafion membrane.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76

ST methanol fuel cell polystyrene sulfonated **grafted** **polymer electrolyte membrane**

IT Membranes, nonbiological
(elec. conductive; **grafted polymer** **electrolyte membrane** for direct methanol fuel cells)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; **grafted** **polymer electrolyte membrane** for direct methanol fuel cells)

IT **Polymerization**
(**graft**, radiochem.; **grafted polymer** **electrolyte membrane** for direct methanol fuel cells)

IT **Membrane** electrodes
Permeability
Polymer electrolytes
(**grafted polymer electrolyte** **membrane** for direct methanol fuel cells)

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(**grafted polymer electrolyte** **membrane** for direct methanol fuel cells)

IT Graphitized carbon black
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**grafted polymer electrolyte** **membrane** for direct methanol fuel cells)

IT Current density
Electric current-potential relationship
(of assembled fuel cells; **grafted polymer** **electrolyte membrane** for direct methanol fuel cells)

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; **grafted** **polymer electrolyte membrane** for direct methanol fuel cells)

IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; **grafted** **polymer electrolyte membrane** for direct methanol fuel cells)

IT Electric energy
(power d.; **grafted polymer** **electrolyte membrane** for direct methanol fuel cells)

IT Fuel cells
(proton exchange **membrane**; **grafted** **polymer electrolyte membrane** for

direct methanol fuel cells)
IT Ionic **conductivity**
(**proton**, degree of **grafting** effect on; **grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT Fluoropolymers, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(sulfo-containing, vinyl; **grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT Fluoropolymers, uses
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(vinyl, sulfo-containing; **grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT 106826-12-4DP, Ethylene, styrene **graft copolymer**, sulfonated
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(LDPE; **grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT 67-56-1, Methanol, uses
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses 7440-44-0, Carbon, uses 9002-84-0, Polytetrafluoroethene
RL: DEV (Device component use); USES (Uses)
(**grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT 109955-91-1DP, Vinylidene fluoride, styrene **graft copolymer**, sulfonated 197895-58-2DP, Ethylene, tetrafluoroethylene, styrene **graft copolymer**, sulfonated
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(**grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT 66796-30-3, Nafion 117
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(**grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT 7782-42-5, Graphite, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**grafted polymer electrolyte membrane** for direct methanol fuel cells)
IT 322012-68-0, TGP-H 090
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(paper; **grafted polymer electrolyte membrane** for direct methanol fuel cells)
REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 13 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:494070 HCAPLUS
DOCUMENT NUMBER: 141:26204
TITLE: Fuel cell incorporating a **polymer electrolyte membrane grafted** by irradiation
INVENTOR(S): Dubitsky, Yuri A.; Lopes Correia Tavares, Ana Berta; Zaopo, Antonio; Albizzati, Enrico
PATENT ASSIGNEE(S): Italy
SOURCE: PCT Int. Appl., 33 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004051782	A1	20040617	WO 2002-EP7166	20020628
W: US				
CA 2489558	AA	20040108	CA 2003-2489558	20030623
WO 2004004053	A2	20040108	WO 2003-EP6580	20030623
WO 2004004053	A3	20040325		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2003280479	A1	20040119	AU 2003-280479	20030623
EP 1518289	A2	20050330	EP 2003-740308	20030623
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
JP 2005531891	T2	20051020	JP 2004-516639	20030623
NO 2005000373	A	20050124	NO 2005-373	20050124
US 2006166046	A1	20060727	US 2005-518467	20050720

PRIORITY APPLN. INFO.: WO 2002-EP7166 A 200206 28

WO 2003-EP6580 W 200306 23

AB The invention concerns a fuel cell comprising: (a) an anode; (b) a cathode; (c) a polymer **electrolyte membrane** placed between the anode and the cathode which comprises at least one polyolefin grafted with side chains containing **proton conductive** functional groups; wherein the fuel cell has: a value of cell resistance at 90° not higher than 0.30 Ω-cm2; preferably comprised between 0.02 Ω-cm2 and 0.25 Ω-cm2; more preferably comprised between 0.05 Ω-cm2 and 0.20 Ω-cm2; a value of cell resistance at 20° differing from the value of cell resistance at 90° of an amount not higher than 90%, preferably not higher than 70%, more preferably not higher than 50%, with respect to the value of cell resistance at 90°. Preferably, the fuel cell is a direct methanol fuel cell.

IC ICM H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell **polymer electrolyte membrane** irradn **grafted**

IT Ion exchange
(capacity; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(cyclic, solvent; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Decomposition catalysts
Fuel cell electrolytes
Gamma ray
Sulfonation
Vehicles
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT **Polymerization**
(**graft**; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Fluoropolymers, uses
Polyolefins
RL: DEV (Device component use); USES (Uses)
(grafted with side chains containing **proton conductive** functional groups; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Cyclic compounds
RL: TEM (Technical or engineered material use); USES (Uses)
(hydrocarbons, solvent; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT **Permeation**

(methanol; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Fuel cells
(polymer electrolyte, direct methanol; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Electric apparatus
(portable; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Alcohols, uses
Aromatic hydrocarbons, uses
Esters, uses
Ethers, uses
Ketones, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(solvent; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 1344-67-8, Copper chloride 7646-79-9, Cobaltous chloride, uses 7720-78-7, Ferrous sulfate 10025-73-7, Chromic chloride 10045-89-3, Ferrous ammonium sulfate
RL: CAT (Catalyst use); USES (Uses)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 7664-93-9, Sulfuric acid, processes 7789-21-1, Fluorosulfonic acid 7790-94-5, Chlorosulfonic acid 13537-32-1, Fluorophosphoric acid 13779-42-5, Chlorophosphoric acid
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 9002-85-1D, Polyvinylidene chloride, grafted with side chains containing **proton conductive** functional groups 9002-86-2D, Polyvinyl chloride, grafted with side chains containing **proton conductive** functional groups 9002-88-4D, Polyethylene, grafted with side chains containing **proton conductive** functional groups 9003-07-0D, Polypropylene, grafted with side chains containing **proton conductive** functional groups 9010-79-1D, Ethylene-propylene **copolymer**, **grafted** with side chains containing **proton conductive** functional groups 9011-17-0D, Hexafluoropropylene-vinylidene fluoride **copolymer**, **grafted** with side chains containing **proton conductive** functional groups 24937-78-8D, Ethylene vinyl acetate **copolymer**, **grafted** with side chains containing **proton conductive** functional groups 24937-79-9D, Polyvinylidene fluoride, grafted with side chains containing **proton conductive** functional groups 24981-14-4D, Polyvinyl fluoride, grafted with side chains containing **proton conductive** functional groups 25038-71-5D, Ethylene-tetrafluoroethylene **copolymer**, **grafted** with side chains containing **proton conductive** functional groups 25101-39-7D, Chlorotrifluoroethylene-propylene **copolymer**, **grafted** with side chains containing **proton conductive** functional groups 25101-45-5D, Chlorotrifluoroethylene-ethylene **copolymer**, **grafted** with side chains containing **proton conductive** functional groups 25684-76-8D,

Tetrafluoroethylene-vinylidene fluoride **copolymer**, **grafted** with side chains containing **proton conductive** functional groups 25750-84-9D, Ethylene butyl **acrylate copolymer**, **grafted** with side chains containing **proton conductive** functional groups
RL: DEV (Device component use); USES (Uses)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 106826-12-4DP, Ethylene-styrene **graft copolymer**, sulfonated
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 67-56-1, Methanol, uses 1333-74-0, Hydrogen, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 14 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:21068 HCAPLUS
DOCUMENT NUMBER: 140:79803
TITLE: Fuel cell incorporating a **polymer electrolyte membrane grafted** by irradiation
INVENTOR(S): Dubitsky, Yuri A.; Lopes Correia Tavares, Ana Berta; Zaopo, Antonio; Albizzati, Enrico
PATENT ASSIGNEE(S): Pirelli & C. S.P.A., Italy
SOURCE: PCT Int. Appl., 31 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004004053	A2	20040108	WO 2003-EP6580	20030623
WO 2004004053	A3	20040325		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
WO 2004051782	A1	20040617	WO 2002-EP7166	20020628

W: US

CA 2489558	AA	20040108	CA 2003-2489558	200306 23
AU 2003280479	A1	20040119	AU 2003-280479	200306 23
EP 1518289	A2	20050330	EP 2003-740308	200306 23

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK

JP 2005531891	T2	20051020	JP 2004-516639	200306 23
NO 2005000373	A	20050124	NO 2005-373	200501 24
US 2006166046	A1	20060727	US 2005-518467	200507 20

PRIORITY APPLN. INFO.:		WO 2002-EP7166	A 200206 28
		WO 2003-EP6580	W 200306 23

AB The invention concerns a fuel cell comprising: (a) an anode; (b) a cathode; (c) a polymer **electrolyte membrane** placed between the anode and the cathode which comprises at least one polyolefin grafted with side chains containing **proton conductive** functional groups; wherein the fuel cell has: a value of cell resistance at 90° not higher than 0.30 Ω-cm2, preferably comprised between 0.2 and 0.25 Ω-cm2, more preferably comprised between 0.05 and 0.20 Ω-cm2; a value of cell resistance at 20° differing from the value of cell resistance at 90° of an amount not higher than 90%, preferably not higher than 70%, more preferably not higher than 50%, with respect to the value of cell resistance at 90°. Preferably, the fuel cell is a direct methanol fuel cell.

IC ICM H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell **polymer electrolyte membrane** irradn **grafted**; methanol direct fuel cell

IT **Permeation**
(MeOH; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Sulfonation
(agents; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(cyclic, solvent; fuel cell incorporating **polymer electrolyte membrane grafted** by

irradiation)
IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT Decomposition catalysts
Electric vehicles
Fuel cell electrolytes
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT Cyclic compounds
RL: TEM (Technical or engineered material use); USES (Uses)
(hydrocarbons, solvent; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT Gamma ray
Plasma
UV radiation
X-ray
(irradiation; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT EPDM rubber
Fluoropolymers, uses
Polyolefins
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**proton-conductive** functional group-containing side chain-**grafted**; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT Fuel cells
(solid **electrolyte**, polymer **electrolyte membrane**, direct methanol; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT Alcohols, uses
Aromatic hydrocarbons, uses
Esters, uses
Ethers, uses
Ketones, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(solvent; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)
IT Hydrocarbons, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(unsatd.; fuel cell incorporating **polymer**

electrolyte membrane grafted by irradiation)

IT Sulfonic acids, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(vinylalkyl; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 1344-67-8, Copper chloride 7720-78-7, Ferrous sulfate 10025-73-7, Chromic chloride 10045-89-3, Ferrous ammonium sulfate 10241-04-0, Cobaltic chloride
RL: CAT (Catalyst use); USES (Uses)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 79-10-7, Acrylic acid, processes 79-41-4, Methacrylic acid, processes 98-83-9, α-Methylstyrene, processes 100-42-5, Styrene, processes 100-42-5D, Styrene, chloroalkyl derivative 100-80-1, m-Methylstyrene 101-37-1, Triallyl cyanurate 611-15-4, O-Methylstyrene 622-97-9, p-Methylstyrene 696-31-1, α-Fluorostyrene 769-57-3, α,β,β-Trimethylstyrene 1321-74-0, Divinylbenzene, processes 1337-81-1, Vinylpyridine 1592-20-7, p-Chloromethylstyrene 2082-61-3, α,β-Dimethylstyrene 7664-93-9, Sulfuric acid, processes 7789-21-1, Fluorosulfonic acid 7790-94-5, Chlorosulfonic acid 13537-32-1, Fluorophosphoric acid 13779-42-5, Chlorophosphoric acid 90622-00-7, Benzene, ethenyl-, trifluoro derivative
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 66796-30-3, Nafion 117 163294-14-2, Nafion 112
RL: DEV (Device component use); USES (Uses)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 67-56-1, Methanol, uses 1333-74-0, Hydrogen, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 12587-47-2, Beta particle
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(irradiation; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

IT 9002-85-1, Polyvinylidene chloride 9002-86-2, Polyvinyl chloride 9002-88-4, Polyethylene 9003-07-0, Polypropylene 9010-79-1, Ethylene-propylene copolymer 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-78-8, Ethylene-vinyl acetate copolymer 24937-79-9, Pvdf 24981-14-4, Polyvinyl fluoride 25101-39-7, Chlorotrifluoroethylene-propylene copolymer 25684-76-8, Tetrafluoroethylene-vinylidene fluoride copolymer 25750-84-9, Butyl acrylate-ethylene copolymer 26160-99-6, Ethylene-Hexafluoropropylene copolymer 52991-93-2, Hexafluoropropylene-propylene copolymer
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(**proton-conductive** functional group-containing side chain-**grafted**; fuel cell incorporating **polymer electrolyte membrane grafted** by irradiation)

L27 ANSWER 15 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:226084 HCAPLUS
DOCUMENT NUMBER: 136:376279
TITLE: Electrochemical characterization of radiation-grafted ion-exchange membranes based on different matrix polymers
AUTHOR(S): Kallio, Tanja; Lundstrom, Matts; Sundholm, Goran; Walsby, Nadia; Sundholm, Franciska
CORPORATE SOURCE: Laboratory of Physical Chemistry and Electrochemistry, Helsinki University of Technology, FIN-02015, Finland
SOURCE: Journal of Applied Electrochemistry (2002), 32(1), 11-18
CODEN: JAELBJ; ISSN: 0021-891X
PUBLISHER: Kluwer Academic Publishers
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Seven **proton conducting** membranes based on different com. fluoropolymer films were prepared by radiation grafting with styrene followed by sulfonation. These membranes were studied as candidates for fuel cell **electrolyte membranes** and compared to Nafion 105 and 117 with respect to **conductivity**, oxygen and **hydrogen permeability**, kinetics of the oxygen reduction reaction (ORR) and performance in a fuel cell. The dependence of the conductivity of the membranes on the relative humidity (RH) and temperature was also determined The conductivity was observed to depend on the membrane thickness and the water uptake. The dependence of the conductivity on the temperature and the RH was the same for all of the exptl. membranes. Reactant gas **permeabilities** appeared to depend only slightly on the matrix material and no major differences in the Tafel slopes and exchange current densities of the ORR were observed Membranes with high water uptakes appeared to be less durable in the fuel cell than membranes with low water uptakes. Thus to prepare a membrane that is durable under the fuel cell conditions, the water uptake must remain low even at the expense of the conductivity

CC 72-3 (Electrochemistry)
Section cross-reference(s): 36, 38, 52

IT **Permeability**
(gas; of radiation-grafted ion-exchange membranes based on different matrix polymers)

IT **Polymer** electrolytes
(radiation-**grafted** ion-exchange membranes based on different matrix polymers)

IT 7782-44-7, Oxygen, properties
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(**permeability** and reduction on radiation-grafted ion-exchange membranes based on different matrix polymers)

IT 1333-74-0, Hydrogen, properties
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(**permeability** through radiation-grafted ion-exchange membranes based on different matrix polymers)

REFERENCE COUNT: 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L27 ANSWER 16 OF 16 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:847094 HCAPLUS
DOCUMENT NUMBER: 134:103156
TITLE: Electrochemical characterization of ethylenetetrafluoroethylene-g-polystyrenesulfonic acid solid polymer electrolytes
AUTHOR(S): Chuv, Carmen; Basura, Vesna I.; Simon, Evelyne; Holdcroft, Steven; Horsfall, Jackie; Lovell, Keith V.
CORPORATE SOURCE: Department of Chemistry, Simon Fraser University, Burnaby, BC, V5A 1S6, Can.
SOURCE: Journal of the Electrochemical Society (2000), 147(12), 4453-4458
CODEN: JESOAN; ISSN: 0013-4651
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Electrochem. characterization of a series of membranes based on polystyrenesulfonic acid grafted onto ethylenete-trafluoroethylene (ETFE-g-PSSA) was determined by chronoamperometry with a microdisk electrode using a solid-state electrochem. cell at 100% relative humidity and over a range of temps. The oxygen diffusion coefficient and **permeability** increased with decreasing equivalent weight (EW). Oxygen solubility marginally decreased. These observations can be explained on the basis of increasing water content with decreasing EW. **Proton conductivity** also increased with water content and does not directly correlate with proton concentration within the membrane.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72
ST proton exchange **membrane** fuel cell **electrolyte**; ethylene tetrafluoroethylene styrenesulfonate **graft polymer** electrolyte
IT Diffusion
Permeability
(of oxygen; electrochem. characterization of ethylene-tetrafluoroethylene-g-polystyrenesulfonic acid solid polymer electrolytes)
IT Ionic **conductivity**
(**proton**; electrochem. characterization of ethylene-tetrafluoroethylene-g-polystyrenesulfonic acid solid polymer electrolytes)
REFERENCE COUNT: 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> d l39 ibib abs hitstr hitind 1-7

L39 ANSWER 1 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:542640 HCAPLUS
DOCUMENT NUMBER: 145:48526
TITLE: **Electrolyte membrane**, its manufacture, and solid **polymer** fuel cell using the membrane
INVENTOR(S): Yamamoto, Kazushige; Emori, Hideyuki; Abe, Masao; Sho, Kinkou
PATENT ASSIGNEE(S): Nitto Denko Corp., Japan

SOURCE: PCT Int. Appl., 29 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006059582	A1	20060608	WO 2005-JP21831	200511 29
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
JP 2006216531	A2	20060817	JP 2005-341633	200511 28

PRIORITY APPLN. INFO.:

JP 2004-351572	A	200412 03
JP 2005-2352	A	200501 07

AB Disclosed is an **electrolyte membrane** which enables a fuel cell to have a high maximum output when used therein since it has high **proton conductivity** and high **hydrogen** gas impermeability. The **electrolyte membrane** is manufactured by impregnating a porous substrate with a solution containing a sulfonate group-containing vinyl **monomer** and **polymerizing** the **monomer**; where vinyl **monomer** contains ≥80 mol% of a vinyl sulfonate having purity ≥90% and/or its salt; and the concentration of the vinyl sulfonate and/or its salt in the solution is ≥35 weight%. The **electrolyte membrane** has a **H+-conductive polymer**, comprising the above required sulfonate group-containing vinyl **monomer** and **filled** in pores of the **porous** substrate. The fuel cell uses the above **electrolyte membrane.**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST fuel cell **electrolyte membrane** sulfonate group contg vinyl **polymer**
IT Polyolefin rubber
RL: DEV (Device component use); USES (Uses)
(ethene-norbornene **copolymers**; structure and manufacture **electrolyte membranes** having sulfonate group-containing vinyl **polymers** for fuel cells)
IT Fuel cell electrolytes

Fuel cells
(structure and manufacture **electrolyte membranes** having sulfonate group-containing vinyl **polymers** for fuel cells)

IT 74-85-1D, Ethene, **polymers** with norborene and olefins
498-66-8D, Norbornene, **polymers** with ethene and olefins
705281-77-2
RL: DEV (Device component use); USES (Uses)
(structure and manufacture **electrolyte membranes** having sulfonate group-containing vinyl **polymers** for fuel cells)

REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L39 ANSWER 2 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:465103 HCAPLUS
DOCUMENT NUMBER: 144:491849
TITLE: **Electrolyte membrane** for fuel cell and its manufacture
INVENTOR(S): Nakazawa, Akira; Takeda, Shinji; Ueshima, Koichi; Sasaki, Shoichi; Fukuchi, Iwao; Oda, Akihiro; Zhou, Hua; Yamaguchi, Takehisa
PATENT ASSIGNEE(S): Hitachi Chemical Co., Ltd., Japan; Tokyo University
SOURCE: Jpn. Kokai Tokkyo Koho, 19 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006128066	A2	20060518	JP 2005-154441	200505 26
US 2006275637	A1	20061207	US 2006-440356	200605 25

PRIORITY APPLN. INFO.:
JP 2004-287802 A 200409 30
JP 2005-154441 A 200505 26
US 2005-739423P P 200511 25

AB The **electrolyte membrane** contains a porous substrate having a plurality of pores, and a **H+-conductive polymer** composition in the pores; where the **polymer** composition comprises a proton acid group-containing aromatic hydrocarbon **resin.** The **electrolyte membrane** is manufactured by holding a **monomer** and/or an oligomer for forming the **H+-conductive**

polymer composition in the pores and **polymerizing** the **monomer** and/or the oligomer.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell **electrolyte membrane** manuf **proton conductive polymer**

IT Fuel cell electrolytes
(structure and manufacture of **electrolyte membranes** containing **H+-conductive polymer filled porous substrates** for fuel cells)

IT Polyimides, uses
RL: DEV (Device component use); USES (Uses)
(structure and manufacture of **electrolyte membranes** containing **H+-conductive polymer filled porous substrates** for fuel cells)

IT 25667-42-9P, Polyether sulfone 866552-08-1P 887132-71-0P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(structure and manufacture of **electrolyte membranes** containing **H+-conductive polymer filled porous substrates** for fuel cells)

L39 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:1049268 HCAPLUS
DOCUMENT NUMBER: 143:309188
TITLE: **Polymer electrolyte membranes** including porous supports, method for their evaluation, and fuel cells
INVENTOR(S): Hiraoka, Hideki; Kubota, Kozo; Yamaguchi, Takeo
PATENT ASSIGNEE(S): Toa Gosei Chemical Industry Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 15 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005268032	A2	20050929	JP 2004-78556	200403 18

PRIORITY APPLN. INFO.: JP 2004-78556 200403 18

AB The membrane comprises a porous support, e.g. (crosslinked) polyolefins, having its pores filled with electrolyte **polymers** and equipped with electrolyte **polymer** layers of ≤ 5 μm on its surfaces. The membranes may be manufactured by (1) impregnation of a porous support with a solution or a dispersion containing electrolyte **monomers** or **monomeric** precursors for electrolyte **polymers**, (2) sandwiching the support with a pair of films, (3) removal of the solution or the dispersion in between the film and the support until the distance between the film and the support is ≤ 5 μm, and (4) **polymerization** of the **monomers**. The membranes

may also be manufactured by preparation of a **porous substrate** having its pores **filled** with electrolyte **polymers** followed by contacting the support surface with a solution of an electrolyte **polymer** different from that in the pores and removing the solvents. The membranes are evaluated by comparing the **proton conductivity** of the membrane under presence of surface water or electrolyte solution and under absence of those. Fuel cells including the membranes are also claimed. The membranes are especially suitable for use in direct alc. fuel cells.

IC ICM H01M008-02
ICS H01B001-06; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST direct alc fuel cell **electrolyte membrane**; polyolefin porous support electrolyte **polymer** impregnated; porous support **electrolyte polymer** impregnated **membrane**

IT Polyolefins
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
((crosslinked), porous support; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT Polyesters, uses
RL: NUU (Other use, unclassified); USES (Uses)
(film; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT Fuel cell electrolytes
Fuel cells
Polyelectrolytes
Porous materials
(porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT Ionic **conductivity**
(**proton**; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT 9002-88-4, Polyethylene
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(crosslinked, porous support; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT 69824-22-2P, 2-Acrylamido-2-methyl propanesulfonic acid-N,N'-methylenebisacrylamide **copolymer**
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(electrolyte; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

IT 25038-59-9, uses
RL: NUU (Other use, unclassified); USES (Uses)
(film; porous supports impregnated with polyelectrolytes and surfaced with electrolyte films for fuel cells and their evaluation from **proton conductivity** under wet and dry conditions)

L39 ANSWER 4 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:823986 HCAPLUS
DOCUMENT NUMBER: 143:232674
TITLE: **Electrolyte membrane**, its manufacture, and fuel cell using the membrane
INVENTOR(S): Kubota, Kouzou; Hiraoka, Hideki; Yamaguchi, Takeo
PATENT ASSIGNEE(S): Toagosei Co., Ltd., Japan
SOURCE: PCT Int. Appl., 23 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005076396	A1	20050818	WO 2005-JP1372	200502 01

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.: JP 2004-26650 A 200402 03

AB The **electrolyte membrane** has a **H+** **conducting polymer** electrolyte **filled** in a **porous substrate**, where the substrate is non-swellable by water or organic solvents containing MeOH, and the **electrolyte membrane** has a swelling ratio [(A-B)/(B-C), A, B, and C are the mass of the swollen membrane, the dry membrane, and the substrate, resp.] 0.1-2.0 after a 1 h immersion in water at 25°. The **electrolyte membrane** is prepared by **polymerizing** the **monomer** of the **polymer** electrolyte **filled** in the **substrate.**

IC ICM H01M008-02
ICS H01M008-10; H01B001-06

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell water methanol nonswellable **polymer** **electrolyte membrane**

IT Fuel cell electrolytes
(structure and manufacture of nonswelling **electrolyte membranes** for direct methanol fuel cells)

IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(crosslinked; structure and manufacture of nonswelling **electrolyte membranes** for direct methanol fuel cells)

IT 69824-22-2 84042-88-6
RL: DEV (Device component use); USES (Uses)
(structure and manufacture of nonswelling **electrolyte membranes** for direct methanol fuel cells)

REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L39 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:412213 HCAPLUS
DOCUMENT NUMBER: 140:409645
TITLE: **Electrolyte membranes** with good durability and low methanol permeability for fuel cells
INVENTOR(S): Hiraoka, Hideki; Yamaguchi, Takehisa
PATENT ASSIGNEE(S): Toa Gosei Chemical Industry Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2004146279	A2	20040520	JP 2002-311929	20021025

PRIORITY APPLN. INFO.: JP 2002-311929 20021025

AB The **electrolyte membranes**, useful for direct methanol fuel cells, showing rate of increase in area after immersion in water at 25° for 1 h ≤20%, comprise

porous substrates filled with **proton-conducting** crosslinked **polymers** prepared from protonic acid-containing **monomers** or their salts and crosslinking agents satisfying ratios of mol number of the **monomers** to number of mol number of the crosslinking agents multiplied by average functional number per a crosslinking agent 50:(2-50).

IC ICM H01M008-02
ICS H01B001-06; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST direct methanol fuel cell **polymer electrolyte membrane**; acrylamidemethylpropanesulfonic acid methylenebisacrylamide **polymer** porous polyethylene electrolyte

IT Polyimides, uses
Polyolefins
RL: DEV (Device component use); USES (Uses)
(crosslinked, porous **electrolyte** substrate; **electrolyte membranes** with good durability and low methanol permeability for fuel cells)

IT Fuel cell **electrolytes**
Fuel cells
Polymer electrolytes
(**electrolyte membranes** with good durability and low methanol permeability for fuel cells)

IT Ionic **conductors**
(**protonic**; **electrolyte membranes** with good durability and low methanol permeability for fuel cells)

IT 69824-22-2P, 2-Acrylamido-2-methylpropanesulfonic acid-N,N'-methylenebisacrylamide **copolymer** 689231-96-7P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**electrolyte membranes** with good durability and low methanol permeability for fuel cells)

IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(porous **electrolyte** substrate; **electrolyte membranes** with good durability and low methanol permeability for fuel cells)

L39 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:216370 HCAPLUS
DOCUMENT NUMBER: 136:265786
TITLE: **Proton-conducting** membrane or film, its manufacture, and fuel cell using it
INVENTOR(S): Fujita, Shigeru; Abe, Masao
PATENT ASSIGNEE(S): Nitto Denko Corp., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002083514	A2	20020322	JP 2000-275015	200009

PRIORITY APPLN. INFO.: JP 2000-275015 06
200009
06

AB The **proton-conducting** membrane comprises a **porous** membrane **filled** with a **polymer** having a phosphate-, phosphonate-, or phosphinate group at side chain in pores. A **proton-conducting** film consists of the above membrane, where a part of voids in the pores are closed. The membrane is manufactured by impregnating a **monomer** having a phosphate-, phosphonate-, or phosphinate side chain in a porous membrane and then **polymerizing** in the pores. The film is manufactured from the membrane by closing the pores. Also claimed is a fuel cell equipped with the membrane or the film as a proton-exchange membrane. The membrane and the film have high durability and strength.

IC ICM H01B001-06
ICS C08F002-00; C08J009-36; C08J009-40; H01B013-00; H01M008-02; H01M008-10; C08L023-02; C08L027-12

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 76

ST **proton conducting polymer** membrane
film phosphate phosphonate phosphinate group; fuel cell **proton conducting polymer** membrane

IT Fluoropolymers, uses
Polyolefins
RL: DEV (Device component use); USES (Uses)
(porous substrates; **proton-conducting** membrane or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)

IT Films
Fuel cell **electrolytes**
Ionic **conductors**
Membranes, nonbiological
(**proton-conducting membrane** or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)

IT Fuel cells
(solid **electrolyte**; **proton-conducting membrane** or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)

IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(UHMWPE, porous substrate; **proton-conducting** membrane or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)

IT 51131-63-6P, Light Ester P 1M **homopolymer** 103719-23-9P, Butyl acrylate-Light Ester P 1M **copolymer**
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**proton-conducting** membrane or film containing **polymer** having phosphate-, phosphonate-, or phosphinate side chain for fuel cell)

L39 ANSWER 7 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:646292 HCAPLUS
DOCUMENT NUMBER: 133:225582
TITLE: **Electrolyte membranes** for

& current application

fuel cells, their manufacture, fuel cells, and manufacture of the fuel cells
INVENTOR(S): Yamaguchi, Takeo; Nakao, Shinichi
PATENT ASSIGNEE(S): Center for Advanced Science and Technology Incubation, Ltd., Japan
SOURCE: PCT Int. Appl., 20 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000054351	A1	20000914	WO 2000-JP1370	20000307
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 2000028310	A5	20000928	AU 2000-28310	20000307
EP 1202365	A1	20020502	EP 2000-906746	20000307
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				
PRIORITY APPLN. INFO.:			JP 1999-60817 A	19990308
			WO 2000-JP1370 W	20000307

AB The **electrolyte membranes** have a **proton conductive polymer filled** in the pores fo a **porous** substrate not swellable by MeOH or H2O. The substrate is an **inorg.** material or a **heat resistant polymer.** The membranes are prepared by irradiating the porous substrate with an energy beam and contacting the substrate with a **monomer** to form the **polymer** . The fuel cells have the **electrolyte membrane** formed on the catalyst layers of their cathodes or anodes, and are prepared by applying sol on an electrode, converting the sol layer to a **porous substrate** film, **filling** the pores in the film with the **proton conductive polymer**, and laminating with the other electrode.

IC ICM H01M008-02
ICS H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST fuel cell **proton conductive polymer**

electrolyte; **polymer** electrolyte porous substrate fuel cell

IT Plasma
(argon plasma in manufacture of **polymer electrolyte membranes** containing **heat resistant** porous substrates for fuel cells)

IT Fuel cell electrolytes
(manufacture of **polymer electrolyte membranes** containing **heat resistant** porous substrates for fuel cells)

IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing **heat resistant** porous substrates for fuel cells)

IT 9002-84-0, Teflon 9003-01-4, Polyacrylic acid
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing **heat resistant** porous substrates for fuel cells)

IT 7440-37-1, Argon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing **heat resistant** porous substrates for fuel cells)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> d l46 ibib abs hitstr hitind 1-10

L46 ANSWER 1 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:655697 HCAPLUS
DOCUMENT NUMBER: 145:127562
TITLE: Proton-conductive **electrolyte membranes**, **electrolytes**, and **electrolyte** solutions, their **polymer** solution dispersions, and membrane-**electrode** assembly (MEA) of **polymer**-electrolyte **fuel cells**
INVENTOR(S): Nakazawa, Akira; Oda, Akihiro; Ueshima, Koichi; Susa, Kenzo; Takeda, Shinji; Yamaguchi, Takehisa
PATENT ASSIGNEE(S): Hitachi Chemical Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 25 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006179448	A2	20060706	JP 2005-98783	200503 30

PRIORITY APPLN. INFO.: JP 2004-103287 A 200403 31

JP 2004-341795 A 200411 26

AB **Electrolyte membranes** contain protonic acid-bearing organic materials, and inorg. materials. The inorg. materials may be OH-group-bearing compds. prepared by **sol** -gel processing, and may have particle diameter of 0.5-100 nm. The inorg. materials are dispersed in solvents or **polymer** solns. to give electrolyte solns. The solvents are removed from the electrolyte solns. to give **electrolyte membranes** . The **polymer**-electrolyte dispersion solns. are **filled** in continuous pores of **porous** membranes, then the solvents are removed to give **electrolyte membranes.** In manufacture of proton-conductive **electrolyte membranes**, chelating agents are added in **sol**-gel preparation of the inorg. materials for forming complexes with 0.5-100 nm diameter Also claimed are the MEA formed by using the membranes above claimed. The membranes show high water contents even in high-temperature and low-humid environment.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76

ST **fuel cell** protonic acid **polymer** electrolyte composite inorg; **sol** gel inorg hydroxide composite **polymer fuel cell** electrolyte; **membrane electrolyte** proton conductive **polymer fuel cell**

IT **Fuel cell electrolytes**
Polyelectrolytes
((**fuel cell**) **electrolyte** **membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Polysulfones, uses
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-, sulfo-containing, proton-conductive **electrolyte** **membranes**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Silsesquioxanes
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-polysulfone-, polysulfone polyether siloxane silsesquioxanes, sulfo-containing, proton-conductive **electrolyte membranes**; (**fuel** **cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Silsesquioxanes
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-polysulfone-, titanoxanes, proton-conductive

electrolyte membranes; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Polysulfones, uses
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-silsesquioxane-, polysulfone polyether siloxane silsesquioxanes, sulfo-containing, proton-conductive **electrolyte membranes**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Polysulfones, uses
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-silsesquioxane-, titanoxanes, proton-conductive **electrolyte membranes**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT **Fuel cells**
(**polymer electrolyte**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Polyethers, uses
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polysulfone-, sulfo-containing, proton-conductive **electrolyte membranes**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Polyethers, uses
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polysulfone-silsesquioxane-, polysulfone polyether siloxane silsesquioxanes, sulfo-containing, proton-conductive **electrolyte membranes**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Polyethers, uses
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polysulfone-silsesquioxane-, titanoxanes, proton-conductive **electrolyte membranes**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT Ionic conductors
(proton-conductive, **electrolyte membranes**; in (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer**

and (OH-group-containing) inorg. compound)

IT Polyimides, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(sulfo-containing, proton-conductive **electrolyte membranes**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT 123-54-6, Acetylacetone, uses
RL: NUU (Other use, unclassified); USES (Uses)
(chelating agents in **sol**-gel preparation of inorg. hydroxides; in (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT 13772-29-7P 14475-63-9P, Zirconium hydroxide 14644-61-2P
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(in (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT 1343-98-2, Silicon hydroxide 12651-23-9, Titanium hydroxide 21645-51-2, Aluminum hydroxide, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(in (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT 1071-76-7, Zirconium butoxide
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(precursors of **sol**-gel preparation of inorg. hydroxides; in (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

IT 875640-02-1DP, proton-exchanged 875640-02-1P 897018-88-1DP, proton-exchanged 897018-89-2P
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(proton-conductive **electrolyte membranes**; (**fuel cell**) **electrolyte membrane** containing protonic-acid-bearing **polymer** and (OH-group-containing) inorg. compound)

L46 ANSWER 2 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:1130924 HCAPLUS
DOCUMENT NUMBER: 143:389830
TITLE: **Electrolyte membrane**, method for producing membrane **electrode** assembly, and **fuel cell**
INVENTOR(S): Hiraoka, Hideki
PATENT ASSIGNEE(S): Toagosei Co., Ltd., Japan
SOURCE: PCT Int. Appl., 32 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005098875	A1	20051020	WO 2005-JP6737	200504 06
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
CA 2562510	AA	20051020	CA 2005-2562510	200504 06
PRIORITY APPLN. INFO.:			JP 2004-114822 A	200404 08
			WO 2005-JP6737 W	200504 06

AB The invention relates to an **electrolyte membrane** for **fuel cells** having a structure wherein a **porous base** is **filled** with an electrolyte **polymer** is disclosed which has solved problems of lack of adhesion to an **electrode** and easily occurring flooding. This **electrolyte membrane** for **fuel cells** suppresses permeation of the fuel, and can be produced with high productivity at low cost. A method for producing an **electrolyte membrane** is disclosed wherein pores of a **porous base** are **filled** with an electrolyte **polymer** while exposing the surface of the porous base. The method for producing an **electrolyte membrane** is characterized in that the **polymer** is obtained from an ion exchange group-containing monomer or from a **solution** or dispersion wherein other components are blended to the monomer according to needs.

IC ICM H01B013-00
ICS H01B001-06; H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72, 76

ST ion exchanger **membrane electrode** assembly **polymer electrolyte fuel cell**

IT **Fuel cell electrodes**
Ion exchangers
Membrane **electrodes**
(membrane **electrode** assembly of **polymer** electrolyte **fuel cell**)

IT Polyolefins
RL: DEV (Device component use); EPR (Engineering process); PEP

(Physical, engineering or chemical process); PROC (Process); USES (Uses)
(membrane **electrode** assembly of **polymer** electrolyte **fuel cell**)

IT **Fuel cells**
(**polymer electrolyte**; **membrane** **electrode** assembly of **polymer** electrolyte **fuel cell**)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 3 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:1049281 HCAPLUS
DOCUMENT NUMBER: 143:327416
TITLE: Solid **polymer electrolyte** **membranes** having roughened surfaces and their composite membranes
INVENTOR(S): Ishikawa, Junichi; Omi, Katsuhiko; Toriida, Masahiro; Fujiyama, Akiko; Takamatsu, Kuniyuki; Tamai, Masashi
PATENT ASSIGNEE(S): Mitsui Chemicals Inc., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 15 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005268059	A2	20050929	JP 2004-79331	200403 19

PRIORITY APPLN. INFO.: JP 2004-79331 200403 19

AB The membranes, useful as **fuel cell** electrolytes, contain 100 parts aromatic hydrocarbon **polymers** bearing protonic acid groups and 0.01-50 parts inorg. fillers. Thus, a varnish containing 4.00 g disodium 5,5'-carbonylbis(2-fluorobenzenesulfonate)-4,4'-difluorobenzophenone-bis(3,5-dimethyl-4-hydroxyphenyl)methane **copolymer** and 0.04 g Wakogel LC 5H (silica; particle size 5 μm) was cast on a glass sheet, dried, crosslinked with UV irradiation, and soaked in an aqueous H2SO4 **soln**. to give a membrane. Carbon paper was screen-printed with a paste containing Nafion and Denka Black (carbon particle), and hot-pressed with the membrane to give a membrane-**electrode** assembly model piece showing no delamination after soaking in 10% aqueous MeOH **solution**

IC ICM H01M008-02
ICS C08K003-00; C08L071-10; H01B001-06; H01M008-10
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST **polymer fuel cell electrolyte** **membrane** adhesion; sulfo polyether polyketone polyelectrolyte membrane silica; surface roughness **polymer** **fuel cell electrolyte membrane**

IT Polyketones
RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyether-, sulfo-containing; solid **polymer electrolyte membranes** containing inorg. **fillers** and having roughened **surfaces** for **fuel cell** electrolytes)

IT Polyethers, uses
RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(polyketone-, sulfo-containing; solid **polymer electrolyte membranes** containing inorg. **fillers** and having roughened **surfaces** for **fuel cell** electrolytes)

IT **Fuel cell electrolytes**
Polyelectrolytes
(solid **polymer electrolyte membranes** containing inorg. **fillers** and having roughened **surfaces** for **fuel cell** electrolytes)

IT 7631-86-9, Sylysia 310P, uses
RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)
(Wakogel LC 5H, Sylysia 310P; solid **polymer electrolyte membranes** containing inorg. **fillers** and having roughened **surfaces** for **fuel cell** electrolytes)

IT 515144-27-1DP, proton-exchanged
RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(solid **polymer electrolyte membranes** containing inorg. **fillers** and having roughened **surfaces** for **fuel cell** electrolytes)

IT 210531-45-6P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(solid **polymer electrolyte membranes** containing inorg. **fillers** and having roughened **surfaces** for **fuel cell** electrolytes)

IT 345-92-6, 4,4'-Difluorobenzophenone
RL: RCT (Reactant); RACT (Reactant or reagent)
(solid **polymer electrolyte membranes** containing inorg. **fillers** and having roughened **surfaces** for **fuel cell** electrolytes)

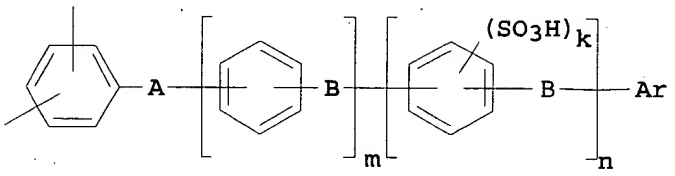
L46 ANSWER 4 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:546311 HCAPLUS
DOCUMENT NUMBER: 143:81081
TITLE: **Polymer electrolyte** composite **membrane**, its manufacture, and solid **polymer fuel cell** which uses the membrane
INVENTOR(S): Otsuki, Toshitaka; Higami, Makoto; Kanaoka, Osayuki; Asano, Yoichi; Nanaumi, Masaaki; Soma, Hiroshi
PATENT ASSIGNEE(S): JSR Ltd., Japan; Honda Motor Co., Ltd.
SOURCE: Jpn. Kokai Tokkyo Koho, 31 pp.
CODEN: JKXXAF

DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005166557	A2	20050623	JP 2003-406364	20031204

PRIORITY APPLN. INFO.: JP 2003-406364 20031204

GI



I

AB The title membrane is obtained by filling a polyarylene, having a repeating unit I (A = divalent electron-withdrawing group; B = divalent electron donating group or direct coupling; Ar = aromatic group having -SO3H substituent; m = integer 0-10; n = integer 0-10; and k = integer 1-4) containing sulfonate group **filled** into voids of a **porous** substrate. The membrane is manufactured by immersing the porous substrate in a **solution** of the polyarylene; and drying the substrate. The **fuel cell** has a membrane-**electrode** structure, containing the above membrane between a pair of **electrode** catalyst layers.

IC ICM H01M008-02
ICS C08J009-40; H01B001-06; H01B013-00; H01M008-10; C08L101-00
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **fuel cell polymer electrolyte membrane** polyarylene manuf
IT **Fuel cell** electrolytes
Fuel cells
(manufacture of **electrolyte** composite **membranes** having sulfonate group containing polyarylenes for **fuel cells**)
IT Fluoropolymers, uses
Polyimides, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(manufacture of **electrolyte** composite **membranes** having sulfonate group containing polyarylenes for **fuel cells**)
IT 9002-84-0, PTFE 851883-22-2
RL: TEM (Technical or engineered material use); USES (Uses)
(manufacture of **electrolyte** composite **membranes** having sulfonate group containing polyarylenes for **fuel cells**)

L46 ANSWER 5 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:116597 HCAPLUS
DOCUMENT NUMBER: 142:201599
TITLE: Direct-methanol **fuel cell** usable even below freezing point, and **electrolyte membrane** and **membrane-electrode** assembly used in the **fuel cell**
INVENTOR(S): Yamaguchi, Takehisa; Harada, Hiroshi; Oya, Nobuo; Yao, Shigeru
PATENT ASSIGNEE(S): Ube Industries, Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005038669	A2	20050210	JP 2003-199011	200307 18

PRIORITY APPLN. INFO.: JP 2003-199011 200307 18

AB The **fuel cell** has an **electrolyte membrane** made of a **porous** membrane **filled** with a **polymer** electrolyte and uses a fuel of aqueous MeOH having MeOH concentration approx. ≥27 weight% (8 mol/L) to show output power d. at 23° ≥45 mW/cm2. Since the high-concentration MeOH aqueous **solution** is used, the **fuel cell** can be used below f.p. in cold area.

IC ICM H01M008-10
ICS H01M008-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **fuel cell polymer electrolyte membrane electrode** assembly; direct methanol **fuel cell** freezing point
IT **Fuel cell** electrolytes
Polymer electrolytes
(direct-methanol **fuel cell** using **porous membrane filled** with **polymer electrolyte** for use even below f.p.)
IT Polyimides, uses
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(polyether-, porous membrane; direct-methanol **fuel cell** using **porous membrane filled** with **polymer electrolyte** for use even below f.p.)
IT Polyethers, uses
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(polyimide-, porous membrane; direct-methanol **fuel cell** using **porous membrane filled** with **polymer electrolyte** for

use even below f.p.)
IT 67-56-1, Methanol, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(direct-methanol **fuel cell** using
porous membrane filled with
polymer electrolyte for use even below f.p.)
IT 69824-22-2P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(electrolyte; direct-methanol **fuel cell** using
porous membrane filled with
polymer electrolyte for use even below f.p.)
IT 26298-81-7P, 3,3',4,4'-Biphenyltetracarboxylic dianhydride-oxydianiline **copolymer** 26615-45-2P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(porous membrane; direct-methanol **fuel cell** using **porous membrane filled** with
polymer electrolyte for use even below f.p.)

L46 ANSWER 6 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2005:35078 HCAPLUS
DOCUMENT NUMBER: 142:138310
TITLE: Integrated **electrolyte** **membrane-electrode** laminate for electrochemical device and its manufacture
INVENTOR(S): Wan, Nianfang; Wang, Gang
PATENT ASSIGNEE(S): Xu, Gang, Peop. Rep. China; Li, Sanyou
SOURCE: PCT Int. Appl., 30 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005004274	A1	20050113	WO 2003-CN527	20030703
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2003304303	A1	20050121	AU 2003-304303	20030703
CN 1788381	A	20060614	CN 2003-826702	20030703

PRIORITY APPLN. INFO.: WO 2003-CN527 A

200307
03

AB The laminate comprises a **polymer** substrate, having high porosity or microporous structure; a porous conductive sheet on both sides of the substrate for supporting the substrate and conducting current to external circuit; an ion exchange **resin filled** inside the **substrate** pores to form a fine and gas impermeable film; and a 1st catalyst layer on outside of the 2 porous conductive sheet. The laminate is manufactured by preparing a porous conductive sheet and the required **polymer** substrate; placing the conductive sheet on both sides of the substrate; injecting an ion exchange **resin solution** to the substrate and volatilizing the solvent in the **resin solution**; and compounding a 1st catalyst layer on outside of the 2 conductive sheet.

IC ICM H01M008-10
ICS H01M008-02; H01M002-14

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **fuel cell electrolyte membrane electrode** laminate structure manuf H

IT **Fuel cell electrodes**
Fuel cell electrolytes
(structure and manufacture of integrated **electrolyte membrane-electrode** laminates for **fuel cells**)

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 7 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2004:893437 HCAPLUS
DOCUMENT NUMBER: 142:97385
TITLE: Method for preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell**(pemfc) and method for preparing composite **polymer** membrane/**electrode** assembly by using the same
INVENTOR(S): Baek, Dong Hyeon; Jun, Yeong Gap; Kim, Chang Su; Kwak, Sang Hui; Shin, Dong Ryeol
PATENT ASSIGNEE(S): Korea Institute of Energy Research, S. Korea
SOURCE: Repub. Korean Kongkae Taeho Kongbo, No pp. given
CODEN: KRXXA7
DOCUMENT TYPE: Patent
LANGUAGE: Korean
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
KR 2001061632	A	20010707	KR 1999-64130	19991228

PRIORITY APPLN. INFO.: KR 1999-64130 19991228

AB A method for preparing a composite **polymer membrane** of **polymer electrolyte membrane** **fuel cell**(PEMFC) is provided which lowers the price of the **polymer membrane**, produces the **electrolytic polymer membrane** having a relatively thin thickness and reduces expansion and contraction of the **polymer** membrane. And a method for preparing a composite **polymer** membrane/**electrode** assembly by using the same is provided. The method for preparing a composite **polymer** membrane comprises steps of: (i) hot pressing or rolling a perfluorosulfonylfluoride/TFE **copolymer resin** at 200-250 °C to obtain a pre-formed precursor sheet; (ii) after **inserting** a **porous** membrane in the center of the pre-formed precursor sheet, hot pressing or rolling it to obtain a composite sheet of the pre-formed precursor and the porous membrane; (iii) treating the composite sheet with an aqueous **solution** of sodium hydroxide in a 5-30 weight ratio to convert the composite pre-formed sheet consisting of the composite perfluorosulfonylfluoride/TFE **copolymer resin** into a Na+ formed composite perfluorosulfonate **polymer** membrane; and (iv) ion exchanging the Na+ formed composite perfluorosulfonate **polymer** membrane with H+ to convert it into a H+ formed composite perfluorosulfonate **polymer** membrane. The composite **polymer** membrane/**electrode** assembly is prepared by the steps of: (i) hot pressing or rolling a perfluorosulfonylfluoride/TFE **copolymer resin** at 200-250 °C to obtain a pre-formed precursor sheet; (ii) after **inserting** a **porous** membrane in the center of the pre-formed precursor sheet, hot pressing or rolling it to obtain a composite sheet of the pre-formed precursor and the porous membrane; (iii) treating the composite sheet with an aqueous **solution** of sodium hydroxide in a 5-30 weight ratio to convert the composite pre-formed sheet consisting of the composite perfluorosulfonylfluoride/TFE **copolymer resin** into a Na+ formed composite perfluorosulfonate **polymer** membrane; (iv) coating the Na+ formed composite perfluorosulfonate **polymer** membrane with a platinum catalyst ink; and (v) hot pressing the catalyst ink coated composite **polymer** membrane at 120-200 °C to produce a composite **polymer** membrane/**electrode** assembly.

IC ICM H01M008-06

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 48

ST **polymer electrolyte membrane** **fuel cell** fluorinated sulfonated polyelectrolyte **electrode**

IT Membranes, nonbiological
(composite; preparing composite **polymer membrane** of **polymer electrolyte membrane** **fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)

IT Ionomers
RL: DEV (Device component use); EPR (Engineering process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(fluoropolymers, sulfo-containing; preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode**

assembly by using same)
IT Fluoropolymers, uses
RL: DEV (Device component use); EPR (Engineering process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(ionomers, sulfo-containing; preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)
IT **Fuel cells**
(**polymer electrolyte**; preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)
IT Membrane **electrodes**
Polyelectrolytes
(preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)
IT Ion exchange
(proton; preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)
IT Thermal expansion
(reduced coefficient; preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)
IT Porous materials
(support membrane; preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)
IT Molding of plastics and rubbers
(thermal compression; preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)
IT 7440-06-4, Platinum, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(preparing composite **polymer membrane** of **polymer electrolyte membrane fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)
IT 116-14-3D, Tetrafluoroethene, **copolymers** with perfluorosulfonyl fluoride- containing monomers
RL: DEV (Device component use); RCT (Reactant); TEM (Technical or engineered material use); RACT (Reactant or reagent); USES (Uses)
(preparing composite **polymer membrane** of

polymer electrolyte membrane
fuel cell pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)

IT 1310-73-2, Sodium hydroxide (Na(OH)), reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(preparing composite **polymer membrane** of **polymer electrolyte membrane** **fuel cell** pemfc and method for preparing composite **polymer** membrane **electrode** assembly by using same)

L46 ANSWER 8 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:781958 HCAPLUS
DOCUMENT NUMBER: 138:224060
TITLE: A Pore-Filling **Electrolyte** **Membrane-Electrode** Integrated System for a Direct Methanol **Fuel** **Cell** Application
AUTHOR(S): Yamaguchi, Takeo; Ibe, Masaya; Nair, Balagopal N.; Nakao, Shin-ichi
CORPORATE SOURCE: Department of Chemical System Engineering, The University of Tokyo, Bunkyo-ku, Tokyo, 113-8656, Japan
SOURCE: Journal of the Electrochemical Society (2002), 149(11), A1448-A1453
CODEN: JESOAN; ISSN: 0013-4651
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

AB A novel **electrolyte membrane** is needed to develop a high performance direct methanol **fuel** **cell.** This membrane should be durable up to 130° to improve the catalytic reaction and MeOH crossover should be reduced. A pore-filled polyelectrolyte membrane was designed where the polyelectrolyte is **filled** into the pores of a **porous** substrate. This creates an integrated system with a membrane and a catalyst layer. The porous substrate was completely inert to aqueous MeOH **solution** and was durable at high temperature The substrate matrix could suppress membrane swelling to reduce MeOH crossover and had mech. strength at high temps. A radical **polymerization** technique was used to fabricate the pore-filling membrane. A porous SiO2 **sol**-gel thin-base membrane on a C **electrode** was used as a membrane-**electrode** integrated system. The **substrate** pores were **filled** with an acrylic acid-vinylsulfonic acid **copolymer** network. The membranes showed high proton conductivity, thermal stability, and low MeOH permeation.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **fuel cell electrolyte membrane** **electrode polymer** porous silica; acrylic acid vinylsulfonic acid **polymer** electrolyte **fuel** **cell**
IT **Fuel cell electrodes**
Fuel cell electrolytes
(**polymer electrolyte-filled** **porous** silica **membrane** integrated with **electrode** for direct methanol **fuel** **cells**)
IT 7440-44-0, Carbon, uses

RL: DEV (Device component use); USES (Uses)
(**electrode; polymer electrolyte-filled porous** silica **membrane** integrated with **electrode** for direct methanol **fuel cells**)

IT 25053-28-5, Acrylic acid-vinylsulfonic acid **copolymer** 501005-91-0
RL: DEV (Device component use); USES (Uses)
(electrolyte; **polymer electrolyte-filled porous** silica **membrane** integrated with **electrode** for direct methanol **fuel cells**)

IT 7631-86-9, Silica, uses
RL: DEV (Device component use); USES (Uses)
(**substrate; polymer electrolyte-filled porous** silica **membrane** integrated with **electrode** for direct methanol **fuel cells**)

REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 9 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:646292 HCAPLUS
DOCUMENT NUMBER: 133:225582
TITLE: **Electrolyte membranes** for **fuel cells**, their manufacture, **fuel cells**, and manufacture of the **fuel cells**
INVENTOR(S): Yamaguchi, Takeo; Nakao, Shinichi
PATENT ASSIGNEE(S): Center for Advanced Science and Technology Incubation, Ltd., Japan
SOURCE: PCT Int. Appl., 20 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000054351	A1	20000914	WO 2000-JP1370	20000307
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 2000028310	A5	20000928	AU 2000-28310	20000307
EP 1202365	A1	20020502	EP 2000-906746	20000307

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL

PRIORITY APPLN. INFO.: JP 1999-60817 A 199903 08

WO 2000-JP1370 W 200003 07

AB The **electrolyte membranes** have a proton conductive **polymer filled** in the pores fo a **porous** substrate not swellable by MeOH or H2O. The substrate is an inorg. material or a heat resistant **polymer**. The membranes are prepared by irradiating the porous substrate with an energy beam and contacting the substrate with a monomer to form the **polymer.** The **fuel cells** have the **electrolyte membrane** formed on the catalyst layers of their cathodes or anodes, and are prepared by applying **sol** on an **electrode**, converting the **sol** layer to a **porous substrate** film, **filling** the pores in the film with the proton conductive **polymer**, and laminating with the other **electrode.**

IC ICM H01M008-02
ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **fuel cell** proton conductive **polymer** electrolyte; **polymer** electrolyte porous substrate **fuel cell**

IT Plasma
(argon plasma in manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)

IT **Fuel cell** electrolytes
(manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)

IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)

IT 9002-84-0, Teflon 9003-01-4, Polyacrylic acid
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)

IT 7440-37-1, Argon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(manufacture of **polymer electrolyte membranes** containing heat resistant porous substrates for **fuel cells**)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L46 ANSWER 10 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:609047 HCAPLUS

DOCUMENT NUMBER: 133:180395
TITLE: Solid gel membrane
INVENTOR(S): Chen, Muguo; Tsai, Tsepin; Yao, Wayne; Chang, Yuen-ming; Li, Lin-feng; Tom, Karen
PATENT ASSIGNEE(S): Reveo, Inc., USA
SOURCE: PCT Int. Appl., 44 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 5
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000051198	A2	20000831	WO 2000-US4881	200002 25
WO 2000051198	A3	20010111		
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 2003099872	A1	20030529	US 1999-259068	199902 26
US 6605391	B2	20030812		
US 6358651	B1	20020319	US 2000-482126	200001 11
CA 2362298	AA	20000831	CA 2000-2362298	200002 25
EP 1155467	A2	20011121	EP 2000-913617	200002 25
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
BR 2000008506	A	20020205	BR 2000-8506	200002 25
JP 2002538585	T2	20021112	JP 2000-601703	200002 25
AU 772935	B2	20040513	AU 2000-35030	200002 25
PRIORITY APPLN. INFO.:			US 1999-259068 A	199902 26
			US 2000-482126 A	200001 11

WO 2000-US4881 W
200002
25

AB A highly conductive **polymer** based solid gel membrane is especially well-suited for use in such electrochem. devices as metal/air, Zn/MnO2, Ni/Cd batteries and hydrogen **fuel cells**, as well as in electrochromic devices such as smart windows and flat panel displays. Furthermore, in rechargeable electrochem. cells, the solid gel membrane is highly-effective for use as a separator between the anode and charging **electrode.** In accordance with the principles of the invention, the highly conductive membrane comprises a support or substrate and a **polymeric** gel composition having an ionic species contained in a **solution** phase thereof. The **polymer**-based gel is prepared by adding an ionic species to a monomer **solution** followed by **polymerization** After **polymerization**, the ionic species is **embedded** in the **polymer-based** gel where it remains. The ionic species behaves like a liquid electrolyte, while at the same time, the **polymer**-based solid gel membrane provides a smooth impenetrable surface that allows for the exchange of ions. An advantage of the novel membrane is that its measured ionic conductivity is much higher than previously observed in prior art solid electrolytes or electrolyte-**polymer** films.

IC ICM H01M006-22
ICS H01M012-06; H01B001-12; C08F251-02; C08F257-02; C08L051-02; C08F251-00; C08F273-00; B01D069-10; G02F001-15

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 38, 74

ST battery **electrolyte** gel **membrane**; **fuel cell electrolyte** gel **membrane**; electrochromic device **electrolyte** gel **membrane**; display device **electrolyte** gel **membrane**

IT Windows
Windows
(electrochromic; ionic conducting **polymer**-based solid gel membrane)

IT Optical imaging devices
(flat panel; ionic conducting **polymer**-based solid gel membrane)

IT **Fuel cell** separators
Fuel cells
Polymerization
Polymerization catalysts
Secondary batteries
Secondary battery separators
(ionic conducting **polymer**-based solid gel membrane)

IT Polyamides, uses
Polyolefins
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)

IT Polyesters, uses
Polysulfones, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)

IT Alkali metal oxides
RL: CAT (Catalyst use); USES (Uses)
(peroxides; ionic conducting **polymer**-based solid gel

membrane)
IT Peroxysulfates
RL: CAT (Catalyst use); USES (Uses)
(peroxydisulfates, alkali metal; ionic conducting **polymer**-based solid gel membrane)
IT **Polymerization**
(photopolymn.; ionic conducting **polymer**-based solid gel membrane)
IT **Polymerization**
(radiochem.; ionic conducting **polymer**-based solid gel membrane)
IT Electrochromic devices
Electrochromic devices
(windows; ionic conducting **polymer**-based solid gel membrane)
IT 50926-11-9, Ito
RL: TEM (Technical or engineered material use); USES (Uses)
(glass; ionic conducting **polymer**-based solid gel membrane)
IT 7727-54-0, Ammonium persulfate
RL: CAT (Catalyst use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)
IT 1313-13-9, Manganese dioxide, uses 1313-99-1, Nickel oxide, uses 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-93-2, Lithium, uses 7439-95-4, Magnesium, uses 7440-02-0, Nickel, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-43-9, Cadmium, uses 7440-44-0, Carbon, uses 7440-66-6, Zinc, uses 11104-61-3, Cobalt oxide 12194-71-7, Perovskite 20667-12-3, Silver oxide 30280-72-9, Acrylic acid-methylenebisacrylamide **copolymer** 84943-80-6, Acrylic acid-methylenebisacrylamide-1-vinyl-2-pyrrolidinone **copolymer**
RL: DEV (Device component use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)
IT 1310-58-3, Potassium hydroxide, uses 1310-65-2, Lithium hydroxide 1310-73-2, Sodium hydroxide, uses 7601-90-3, Perchloric acid, uses 7647-01-0, Hydrochloric acid, uses 7647-14-5, Sodium chloride, uses 7664-38-2, Phosphoric acid, uses 7664-93-9, Sulfuric acid, uses 7778-80-5, Potassium sulfate, uses 9002-89-5, Polyvinyl alcohol 9004-34-6, Cellulose, uses 12125-02-9, Ammonium chloride, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)
IT 79-06-1, 2-Propenamide, reactions 79-10-7, Acrylic acid, reactions 79-41-4, reactions 88-12-0, 1-Vinyl-2-pyrrolidinone, reactions 110-17-8, Fumaric acid, reactions 110-26-9 541-47-9, 3,3-Dimethyl acrylic acid 627-64-5, Fumaramide 2210-25-5, N-Isopropylacryl amide 2680-03-7 3039-83-6, Vinylsulfonic acid, sodium salt 10117-38-1, Potassium sulfite
RL: RCT (Reactant); RACT (Reactant or reagent)
(ionic conducting **polymer**-based solid gel membrane)
IT 9004-32-4, Carboxymethyl cellulose 9005-25-8, Corn starch, uses 25038-59-9, Polyethylene terephthalate, uses 25704-18-1, Poly(sodium 4-styrenesulfonate) 97917-26-5, Acrylamide-Methacrylic acid-methylenebis(acrylamide) **copolymer** 104983-61-1, Maleic acid-styrenesulfonic acid **copolymer**, sodium salt
RL: TEM (Technical or engineered material use); USES (Uses)
(ionic conducting **polymer**-based solid gel membrane)

=> d l51 ibib abs hitstr hitind 1-4

L51 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:33823 HCAPLUS
DOCUMENT NUMBER: 144:111307
TITLE: Direct methanol fuel cells, their **proton -conductive electrolyte membranes** having **inorganic** skeletons, and manufacture thereof
INVENTOR(S): Suzuki, Takayuki; Chiba, Takato
PATENT ASSIGNEE(S): Konica Minolta Holdings, Inc., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 17 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006012527	A2	20060112	JP 2004-186208	200406 24

PRIORITY APPLN. INFO.: JP 2004-186208 200406 24

AB The **electrolyte membranes** with high **proton conductivity** and reducing MeOH crossover, comprise **porous inorg.** films **filling**, in their pores, **proton-conductive polymers** prepared from sulfonic acid group-containing ethylenically unsatd. compds. and compds. (R1O)nSiR2m (R1 = C≤4 alkyl; R2 = **copolymerizable** organic group; m, n = 1-3; m + n = 4). The membranes are formed by firing of precursors obtained from **inorg.** and organic particle dispersions.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST direct methanol fuel cell electrolyte crossover suppressed; **proton cond** hybrid **polymer** electrolyte DMFC; styryltrimethoxysilane vinylsulfonic acid **copolymer** DMFC electrolyte

IT Fuel cells
(direct methanol; **proton-conductive electrolyte membranes filling** sulfonic acid-containing **polymers** in **porous ceramics** for DMFC)

IT Ionic **conductors**
(**proton conductive**; **proton-conductive electrolyte membranes filling** sulfonic acid-containing **polymers** in **porous ceramics** for DMFC)

IT 7631-86-9, Snowtex 50, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(colloidal, **electrolyte membrane** skeletons; **proton-conductive electrolyte membranes filling** sulfonic acid-containing

polymers in **porous ceramics** for DMFC)
IT 872580-31-9P 872580-32-0P 872580-33-1P 872580-34-2P
872580-35-3P 872580-36-4P 872580-37-5P 872580-38-6P
872580-39-7P 872580-40-0P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**electrolyte membranes**; **proton-conductive electrolyte membranes** **filling** sulfonic acid-containing **polymers** in **porous ceramics** for DMFC)
IT 9003-53-6, Polystyrene
RL: NUU (Other use, unclassified); USES (Uses)
(pore formers; **proton-conductive electrolyte membranes filling** sulfonic acid-containing **polymers** in **porous ceramics** for DMFC)

L51 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:13443 HCAPLUS
DOCUMENT NUMBER: 144:111257
TITLE: Method of preparation of **polymer** membrane for fuel cell
INVENTOR(S): Kim, Hee-Tak; Kim, Hyoung-Juhn; Yoon, Hae-Kwon; Kweon, Ho-Jin
PATENT ASSIGNEE(S): S. Korea
SOURCE: U.S. Pat. Appl. Publ., 10 pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2006003209	A1	20060105	US 2005-153699	200506 14
KR 2006001628	A	20060106	KR 2004-50771	200406 30
JP 2006019273	A2	20060119	JP 2005-183915	200506 23
CN 1716671	A	20060104	CN 2005-10081381	200506 28

PRIORITY APPLN. INFO.: KR 2004-50771 A 200406 30

AB A **polymer electrolyte membrane** for a fuel cell includes a **porous** membrane formed with fine pores, hygroscopic **polymer** layers coated inside the fine pores of the **porous** membrane, and **proton conductive polymers filled** in the fine pores of the **porous** membrane coated with the hygroscopic **polymer** layers.
INCL 429029000; 429033000; 429129000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38
ST **polymer** membrane prepn fuel cell
IT Ketones, uses
RL: DEV (Device component use); USES (Uses)
(aromatic, **polymers**; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Coating process
(dip; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Coating process
(doctor-blading and silk-screening; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Rayon, uses
RL: DEV (Device component use); USES (Uses)
(fabrics, nonwoven; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Carboxylic acids, uses
RL: DEV (Device component use); USES (Uses)
(perfluoro, **polymers**; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Sulfonic acids, uses
RL: DEV (Device component use); USES (Uses)
(perfluorosulfonic acid **polymers**; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Polyketones
RL: DEV (Device component use); USES (Uses)
(polyether-, sulfides, defluorinated; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Polyimides, uses
Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(polyether-; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyimide-; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyketone-, sulfides, defluorinated; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Fuel cells
(**polymer electrolyte**; **porous polymer membrane** containing **proton conductive polymers** for fuel cells)

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Polyquinoxalines
RL: DEV (Device component use); USES (Uses)
(polyphenylquinoxalines; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polysulfone-; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Conducting **polymers**
Lithography
Porosity
Spraying
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Fluoropolymers, uses
Glass fibers, uses
Polyamides, uses
Polybenzimidazoles
Polyesters, uses
Polyimides, uses
Polyolefins
Polyoxyalkylenes, uses
Polyoxymethylenes, uses
Polysulfones, uses
Polythiophenylenes
RL: DEV (Device component use); USES (Uses)
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(sulfo-containing, perfluoro; **porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT 7440-06-4, Platinum, uses
RL: CAT (Catalyst use); USES (Uses)
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT 7440-44-0, Carbon, uses
RL: CAT (Catalyst use); TEM (Technical or engineered material use); USES (Uses)
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)
IT 9002-81-7, **Polymethylene** oxide 9002-84-0, Ptfe
9002-89-5, Polyvinyl alcohol 25249-16-5, PHEMA 25322-68-3, Peo

25322-69-4, Polypropylene oxide 25734-65-0, Poly(2.2'-(m-phenylene)-5,5'-bibenzimidazole 25736-86-1, Polyethylene glycol methacrylate 25852-47-5, Polyethylene oxide dimethacrylate 26403-58-7, Polyethylene glycol acrylate 26570-48-9, Polyethylene oxide diacrylate 32109-42-5, Poly(2,5-benzimidazole) 62487-95-0, Polyhydroxymethyl acrylate
RL: DEV (Device component use); USES (Uses)
(**porous polymer** membrane containing **proton conductive polymers** for fuel cells)

L51 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:7296 HCAPLUS
DOCUMENT NUMBER: 144:111251
TITLE: Method of fabrication of **polymer electrolyte membrane** for fuel cell
INVENTOR(S): Kim, Hee-Tak; Kim, Hyoung-Juhn; Kweon, Ho-Jin
PATENT ASSIGNEE(S): S. Korea
SOURCE: U.S. Pat. Appl. Publ., 9 pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2006003214	A1	20060105	US 2005-173070	20050630
KR 2006001627	A	20060106	KR 2004-50770	20040630
JP 2006019294	A2	20060119	JP 2005-190558	20050629
CN 1716672	A	20060104	CN 2005-10081385	20050630
PRIORITY APPLN. INFO.:			KR 2004-50770 A	20040630

AB A **polymer electrolyte membrane** for a fuel cell includes a **porous** membrane forming micropores. **Proton-conducting polymers fill** the micropores of the **porous** membrane. In addition, a method for preparing the **polymer electrolyte membrane** includes: preparing a **porous** membrane having a plurality of micropores; and filling the micropores with **proton-conducting polymer.**
INCL 429030000; 429033000; 521027000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **polymer electrolyte membrane** fuel cell
IT **Glass** fibers, uses
RL: DEV (Device component use); USES (Uses)
(cellular; **polymer electrolyte**

membrane for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Rayon, uses
RL: DEV (Device component use); USES (Uses)
(fabrics, nonwoven, **porous**; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Cellular materials
RL: DEV (Device component use); USES (Uses)
(**glass** fibers; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Carboxylic acids, uses
RL: DEV (Device component use); USES (Uses)
(perfluoro, **polymers**, **porous**; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Sulfonic acids, uses
RL: DEV (Device component use); USES (Uses)
(perfluorosulfonic acid **polymers**, **porous**; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Polyketones
RL: DEV (Device component use); USES (Uses)
(polyether-, defluorinated, sulfides, **porous**; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Polyimides, uses
Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(polyether-, **porous**; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyimide-, **porous**; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polyketone-, defluorinated, sulfides, **porous**; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Fuel cell **electrolytes**
(**polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

IT Polyesters, uses
RL: DEV (Device component use); USES (Uses)
(**polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT Fuel cells
(**polymer electrolyte; polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; **polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT Polyethers, uses
RL: DEV (Device component use); USES (Uses)
(polysulfone-, **porous; polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT **Membranes**, nonbiological
(**porous; polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT Fluoropolymers, uses
Polyamides, uses
Polybenzimidazoles
Polyimides, uses
Polyolefins
Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(**porous; polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(sulfo-containing, perfluoro, **porous; polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT 25734-65-0, Poly[2,2'-(m-phenylene)-5,5'-bibenzimidazole]
32109-42-5, Poly(2,5-benzimidazole)
RL: DEV (Device component use); USES (Uses)
(**polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)
IT 9002-84-0, Ptfe 9002-88-4, Polyethylene 25038-59-9, uses
RL: DEV (Device component use); USES (Uses)
(**porous; polymer electrolyte membrane** for fuel cell from **porous** membrane and **proton-conducting polymer**)

L51 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2001:314816 HCAPLUS
DOCUMENT NUMBER: 135:95113
TITLE: **Proton conducting membranes based** on **electrolyte filled microporous** matrices
AUTHOR(S): Haufe, S.; Stimming, U.
CORPORATE SOURCE: E19, Department of Physics, Interfaces and Energy Conversion, Technische Universitat Munchen, Garching, D-85748, Germany
SOURCE: Journal of Membrane Science (2001), 185(1), 95-103
CODEN: JMESDO; ISSN: 0376-7388
PUBLISHER: Elsevier Science B.V.
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Polysulfone and microglass fiber fleeces were used as **microporous** supports for electrolyte based composites. The membranes were prepared by impregnating the matrix with various **inorg.** acids as well as with a 5 weight% Nafion solution Among the various combinations of **microporous** supports and electrolytes both types of fleece filled with 5 mol/dm3 H2SO4 and the microglass fiber fleece impregnated with Nafion (.apprx.26 weight% uptake) exhibit a resistance similar to that of Nafion-117 (0.530 Ω-cm2), whereas the polysulfone fleece soaked in Nafion® shows a distinctively higher ohmic resistance. With regard to the material properties, the polysulfone/H2SO4 composite exhibits a specific conductivity higher than Nafion-117 but still more than an order of magnitude lower than expected on the basis of the **porosity** of the support (83%) and the specific conductivity of the acid. Therefore, the uptake of electrolyte seems to depend strongly on the surface characteristics of the **microporous** support.H2/O2 fuel cell measurements with MEAs obtained by using a cold press technique reveal performances comparable to MEAs with Nafion-117 electrolyte for both the polysulfone/H2SO4 composite and the microglass fiber/Nafion composite.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72, 76

ST **proton conducting membrane electrolyte filled microporous** matrix; polysulfone microglass fiber fleece electrolyte fuel cell

IT Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(fiber; **proton conducting membranes based** on **electrolyte filled microporous** matrixes)

IT **Glass** fibers, uses
RL: DEV (Device component use); USES (Uses)
(microfibers; **proton conducting membranes based** on **electrolyte filled microporous** matrixes)

IT Synthetic **polymeric** fibers, uses
RL: DEV (Device component use); USES (Uses)
(polysulfones; **proton conducting membranes based** on **electrolyte filled microporous** matrixes)

IT Fuel cell **electrolytes**
(**proton conducting membranes based** on **electrolyte filled**

microporous matrixes)
IT Ionic **conductivity**
(**proton; proton conducting membranes based** on **electrolyte filled microporous** matrixes)
IT 7664-93-9, Sulfuric acid, uses
RL: DEV (Device component use); USES (Uses)
(**electrolyte; proton conducting membranes based** on **electrolyte filled microporous** matrixes)
IT 66796-30-3, Nafion-117
RL: DEV (Device component use); USES (Uses)
(**proton conducting membranes based** on **electrolyte filled microporous** matrixes)
REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> d l53 ibib abs hitstr hitind

L53 ANSWER 1 OF 1 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2006:443108 HCAPLUS
DOCUMENT NUMBER: 144:471407
TITLE: **Proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells, and same fuel cells
INVENTOR(S): Emori, Hideyuki; Yamamoto, Kazunari
PATENT ASSIGNEE(S): Nitto Denko Corp., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006120510	A2	20060511	JP 2004-308150	200410 22

PRIORITY APPLN. INFO.: JP 2004-308150 200410 22

AB The **electrolyte membranes** are constituted by **porous** substrates and **proton-conductive** polymers **filled** in the pores. The **porous** substrates are composed of (A) 50-99 weight% of first polymers containing polyolefins with weight-average mol. weight of ≥500,000, and optionally thermoplastic elastomers and/or **graft copolymers**, and (B) 1-50 weight% of second polymers bearing double bond on main- or side chains whose ≥1% is substituted with epoxy groups. The membranes show high **proton conductivity** and inhibit methanol **permeation.**
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 39

ST **proton conductive** polymer **electrolyte** **membrane** fuel cell; polyolefin blend polymer electrolyte fuel cell

IT Styrene-butadiene rubber, uses
RL: DEV (Device component use); USES (Uses)
(block, triblock, epoxidized, Epofriend A 1005, in **porous** substrates of **membranes**; in **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT Polyolefins
Thermoplastic rubber
RL: DEV (Device component use); USES (Uses)
(in **porous** substrates of **membranes**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT Fuel cells
(polymer **electrolyte**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT Polyelectrolytes
(**proton-conductive**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(in **porous** substrates of **membranes**; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT 69824-22-2P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**proton conductor**, in pores of **porous** substrates; **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

IT 694491-73-1D, block, triblock, epoxidized 694491-73-1D, epoxidized
RL: DEV (Device component use); USES (Uses)
(styrene-butadiene rubber, Epofriend A 1005, in **porous** substrates of **membranes**; in **proton-conductive electrolyte membranes** for polymer-**electrolyte** fuel cells)

=>